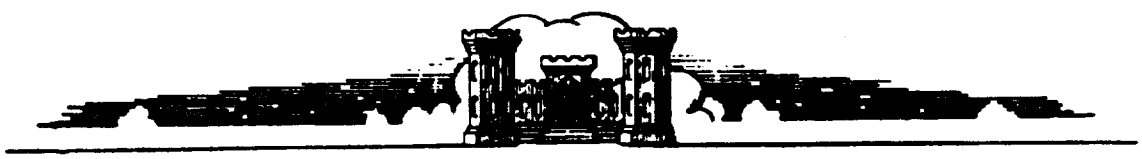
DORCHESTER BAY
NEPONSET RIVER
MASSACHUSETTS

SURVEY

(REVIEW OF REPORTS)



U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

OCT. 13, 1961

SYLLABUS

The Division Engineer finds that the existing project for Dorchester Bay - Neponset River is inadequate for the foreseeable prospective commerce in deep draft vessels. The specifically prospective commerce will be destined to a new power plant to be erected adjacent to the waterway. The Division Engineer further finds that benefits to be obtained by providing deep draft navigational facilities for this commerce are sufficient to warrant Federal participation in improvement. He recommends therefore that the existing project be modified. He considers the proper modification should consist of a channel 300 feet wide and 35 feet deep, extending from the main ship channel in Boston Harbor to the vicinity of Squantum Point, a distance of about 3 miles. The modification, should also include a 33-acre turning basin 35 feet deep in the vicinity of Squantum Point. The estimated cost of construction for new work is $7,050,000, excluding $23,000 for pre-authorization studies $12,000 for additional aids to navigation and $315,000 for required dredging by local interests.

The project is recommended subject to the requirements that local interests construct the first unit of the proposed power plant prior to, or in conjunction with, construction of the navigational improvement and dredge an approach channel and berth to depths commensurate with the project depth. The estimated cost of the approach channel and berth is $315,000. The net cost to the United States is $7,050,000 for construction, $12,000 for additional aids to navigation, and $23,000 for pre-authorization studies. Additional maintenance is estimated at $10,000 for the channel and basin and $1,000 for aids to navigation. The benefit-cost ratio is 2.9.

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U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
424 Trapelo Road
Waltham 54, Mass.

NEDGW 13 October 1961

SUBJECT: Survey (Review of Reports) of Dorchester Bay and Neponset River, Massachusetts

TO: Chief of Engineers, Department of the Army, Washington, D.C.
ATTN: ENGCW-P

AUTHORITY

1. This report is submitted in compliance with a resolution, adopted October 15, 1957 by the Committee on Public Works of the United States Senate, which reads as follows:

> "RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, That the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved 13 June 1902, be, and is hereby, requested to review the reports on Dorchester Bay and Neponset River, Massachusetts, submitted in House Document No. 394, 77th Congress, 1st Session, and previous reports, with a view to determining if it is advisable to modify the existing project in any way at this time."

2. A review report was assigned to the New England Division by letter of the Chief of Engineers, dated October 28, 1957.

Purpose and Extent of Study

3. This study was made to determine the economic justification of modifying the existing Federal navigation project in accordance with the desires of local interests. In the preparation of this report, a detailed hydrographic survey consisting of soundings and probings was made for the purpose of determining the character and amount of materials involved in any plan of improvement. Available maps, charts, aerial photographs, commercial statistics, and other data pertaining to the waterway have been studied. A public hearing was held in the Quincy Y.M.C.A. auditorium, Quincy, Massachusetts on 28 January 1959. The information

obtained is described under, "Improvements Desired", in this report. The information obtained from the public hearing has been further supplemented in subsequent contacts with local interests. All aspects of the desired improvements have been considered in this report.

Description of Navigation Conditions

4. The Neponset River is a short, partially navigable stream about 16 miles long. It originates in the town of Walpole, Massachusetts and terminates in Dorchester Bay, a shallow arm of Boston Harbor. The bay comprises an area of about 5 square miles. Its entrance is located in close proximity to the 40-foot main ship channel of Boston Harbor. From the entrance, an improved channel extends generally in a southwesterly direction to Commercial Point, about 3 miles upstream. This channel has been dredged to a depth of 18 feet by the Federal Government. Controlling depths in 1959 for this segment of the channel were 17 feet to a point about 1,000 feet downstream of Commercial Point and 13 feet for the remainder.

5. From Commercial Point the channel extends upriver in a generally southerly direction about 1-1/8 miles to the New Haven Railroad Bridge. It then continues through the bridge about 500 feet to the Neponset Highway Bridge, which marks the upper limit of Federal improvement. This channel has been dredged to 15 feet. Controlling depths, also in 1959, were 13 feet to the railroad bridge, and then 11 feet to the highway bridge.

6. Above the highway bridge the river meanders through marshland for about 2 miles to a dam at Milton, Massachusetts. The dam marks the upstream limit of navigation. This portion of the river has been improved by the Commonwealth of Massachusetts. The improvement consists of a 6-foot deep channel with widths varying from 50 to 100 feet for the entire length. In addition to the previously described channels there is a small natural recreational basin west of Commercial Point. This basin is chiefly used for recreational boats. Controlling depth in its entrance channel is about 7 feet.

7. The mean range of tide for Neponset River is 9.5 and the spring range 11.0 feet. The area is shown on the maps accompanying this report, U. S. Army Map Service map entitled "BOSTON SOUTH", and on U. S. Coast and Geodetic Chart No. 246.

Tributary Area

8. Three municipalities border the navigable portion of the waterway. Specifically the cities of Boston and Quincy border the

lower portion and the town of Milton borders the upper portion. Boston and Quincy, in the vicinity of the waterway, are chiefly industrialized areas, while Milton is primarily residential.

9. Boston is the largest city in New England. It is also the principal seaport for the highly industrialized central section of the region. Its commerce enjoys direct service to major European and South American ports along with extensive domestic coastwise shipping. In 1960 the population of the city itself was 698,197. This figure is not considered indicative of the populous nature of the region as its metropolitan area, within a radius of about 20 miles, contains over 2,500,000 persons in 79 communities.

10. Quincy, a suburb of Boston, is a smaller highly industrialized city having a population of 84,709 in 1960. Among its diversified products may be classed such items of manufacture as electronic components, machine parts, tools, steel fabrications, motors, and machines. The industrial aspect of the city has increased to such an extent that it is becoming necessary to develop new sources of power. Hence the Boston Edison plans to install an initial 250,000 kw. generating plant in Quincy at the former Squantum Airbase, situated on the Dorchester Bay waterfront. The capacity of this proposed plant will be increased, as the power demand warrants, and will have an ultimate capacity of 1,000,000 kw.

11. The area is served by the New Haven Railroad, with connections north via the Boston and Maine RR and west via the New York Central RR. Logan International Airport is situated in Boston. Regularly scheduled commercial plane service to all points is obtainable from this facility.

Bridges.

12. The navigable portion of the waterway contains 1 railroad and 4 highway bridges. Pertinent data with respect to these bridges are tabulated below.

Name & Use	Owner	Miles Above Mouth	Vertical Clearance Above M.L.W.	Vertical Clearance Above M.H.W.	Horizontal Clearance	Type of Span
New Haven RR Bridge	New Haven RR	1.4	15.3	5.9	49.7	Bascule
Neponset Ave. Highway Bridge	Cities of Boston & Quincy	1.5	20.7	10.9	78.6	Bascule
Roy C. Smith Highway Bridge	Comm. of Mass.	2.3	30.0	20.4	136	Fixed
Granite Ave. Highway Bridge	City of Boston & Town of Milton	2.6	16.0	6.4	50.0	Bascule
Morrissey Blvd. Highway Bridge	Metrop. Dist. Com.	*	22.7	12.9	65	Bascule

*This bridge crosses an arm of Dorchester Bay west of the Neponset River.

Prior Reports

13. Previous reports on Dorchester Bay and Neponset River are described in the following tabulation:

Published In HD	Congress	Session	Type of Report	Work Considered & Recommendation
35	52nd	2nd	Prel. Exam. of Neponset R.	Survey Recommended.
83	59th	2nd	Exam. & Survey of Dorchester Bay & Neponset River	Channel 175' wide 18' deep thru Dorchester Bay and mouth of river to Commercial Point and 100' Wide, 15' deep in Neponset R. from Comm. Pt. to Neponset Hwy. Br. Recommended.
113	64th	1st	Prel. Exam. & Survey Dorchester Bay & Nep. R. to Hwy. Br.	Widen channel to 175' to Nep. Hwy. Br. Recommended.
147	70th	1st	Prel. Exam. & Survey.	30-foot channel 300 feet wide in Dorchester Bay from Boston Harbor Main Ship Channel to connect with local approach channel to the Cow Pasture. Recommended.
394	77th	1st	Survey (Review of Reports) of Dorchester Bay & Nep. River, Mass.	25-foot channel 300'wide from 40' ship channel to Commercial Point in lieu of channel to Cow Pasture. Recommended.

Existing Corps of Engineers Project

14. The existing project was authorized by the River and Harbor Act of 2 March 1907 and supplemented by enactments to 1945. It provides for a channel 18 feet deep and 175 feet wide from the main ship channel in Boston Harbor to Commercial Point, thence 15 feet deep and 100 feet wide to Neponset Highway Bridge. The River and Harbor Act of March 2, 1945 authorized a channel 300 feet wide and 25 feet deep to Commercial Point subject to certain requirements of local cooperation which have not been fulfilled. At the present time there is no indication that the requirements will be fulfilled and this project modification is considered inactive.

Local Cooperation on Existing and Prior Projects

15. The River and Harbor Act of March 2, 1907, as an item of local cooperation, specified that the Neponset River, in the area between the Neponset Avenue Highway Bridge and Milton Mills, be dredged and maintained to a depth of 6 feet, by the Commonwealth of Massachusetts or other local agency. These conditions were accepted and the channel to Milton, dredged by the Commonwealth in August 1910 at a cost of $34,269.70.

16. The River and Harbor Act of July 3, 1930 authorized a channel 30 feet deep and 300 feet wide to a point off the Cow Pasture in Dorchester Bay. The authorization was subject to the requirements that local interests give assurances that an approach channel and turning basin would be dredged to a depth of 30 feet in the vicinity of the Cow Pasture, and that local interests would construct one unit of a terminal development according to plans approved by the Chief of Engineers. These requirements were not fulfilled and this phase of the project was abandoned under conditions of the River and Harbor Act of March 2, 1945.

17. The River and Harbor Act of March 2, 1945 authorized the 25-foot deep channel to Commercial Point subject to the following requirements of local cooperation:

a. Provide berthing space alongside the existing oil terminal dock at Commercial Point at least 25 feet deep at mean low water and 100 feet wide, extending along the dock not less than 1,000 feet from the center of the proposed Federal channel, and an entrance to the berth 25 feet deep and of sufficient size to permit turning vessels 500 feet in length.

b. Provide assurance satisfactory to the Secretary of War that the oil storage capacity at Commercial Point will be increased to at least 6,000,000 gallons within 1 year of the date of completion of the Federal project;

c. Make available, without cost to the United States, suitable areas for the disposal of material dredged from the Federal channel;

d. Hold and save the United States free from all claims for damage resulting from the improvement.

As stated previously, the requirements have not been fulfilled, and this aspect of improvement is inactive.

Other Improvements

18. The Commonwealth of Massachusetts in 1914 widened the existing 15-foot Federal channel in the vicinity of the former Lawley Yacht Basin, now the Boston Yacht Basin. Cost of this work was $1,682. In 1915, the State dredged a channel, 90 feet wide, 12 feet deep and 1,600 feet long in the vicinity of Commercial Point. A turning basin, about 9 acres in area, and of the same depth as the channel was also included in this work. A basin 6 feet deep was provided near Commercial Point. Total cost of this work was $53,213. In 1916, the State also dredged a basin in the Neponset River in the vicinity of Milton. Cost of this work was $7,790. Total expenditures for these improvements were $62,685. In 1956, the State expended $71,200 for maintenance and an additional $20,000 in 1960.

Terminal and Transfer Facilities

19. The waterway contains a total of 19 wharves, many of which are not used at the present time. Detailed descriptions of the facilities and their use are explained below.

a. The Boston Gas Company has a marginal wharf 900 feet long on the north side of Commercial Point. Its construction consists of a masonry bulkhead with solid fill behind. Depths alongside vary from 1 to 8 feet. This wharf is not used.

b. Immediately east of the Boston Gas Company, the Gulf Oil Corporation operates a small local truck distribution facility. Its wharf consists of timber decked and pile extension to a masonry bulkhead, backed with solid fill. It has 525 feet of berthing space with depths ranging from 7 to 8 feet. Two 6-inch pipelines extend from the wharf to 10 steel storage tanks with a total capacity of 19,380 barrels. There is also a 6-inch pipeline extending to a tank on the gas company wharf. Capacity of the tank is 285,690 barrels of gas oil.

c. South of Gulf Oil are two slips inside a steel frame building with a concrete floor supported by timber piles. The slips are approximately 100 by 40 feet each. This facility was formerly used for shipment of refuse by barge. The city of Boston operated it. It is now used only for mooring barges.

d. About 2,000 feet upstream, the Boston Yacht Basin and Marine Works operates 3 pile and timber piers. Two parallel marine railways are located between the two piers. The wharves are used for fueling, mooring, and repairing small vessels.

Berth depths range from 5 to 10 feet. Over 1,000 feet of berthing space are available at these wharves. The 2 upstream wharves are in good usable condition, the other in poor condition.

e. The Tracy Yacht Basin is located adjacent to and east of the Boston Yacht Basin. This facility has 3 pile and timber wharves with about 700 feet of berthing space. The downstream pier is a timber decked L-shaped wharf with a 240-foot timber pile and catwalk in line with the east face of the wharf. The next upstream is timber decked wharf with a 45 x 4-foot timber catwalk extending from its face. Immediately south of this wharf are two marine railways, principally used for small boats. The next wharf upstream is of timber bulkhead construction on its north side and concrete bulkhead on its southeast side. Both bulkheads are backed with solid fill. A 55-foot graving dock forms part of the southeast side of this wharf. Berthing depths for the 3 wharves range from 5 to 10 feet.

f. The Stearns Lumber wharf is about 2,000 feet upstream of the Tracy Yacht Basin. It is of timber and pile construction. This wharf is not currently used and has very shallow depths alongside.

g. Immediately above this pier, just below the New Haven RR Bridge is a masonry bulkhead marginal wharf owned by the Blakeslee - Rollins Corporation, marine contractors. It is used for storage of floating equipment.

h. Above the railroad bridge on the left bank there are two marginal wharves. The first of masonry bulkhead construction with solid fill is used by Northeast Marine Service for the repair of small boats. There is also a small marine railway at this facility. The second wharf is also of masonry bulkhead construction with solid fill, operated by the Frost Coal and Oil Company. It has 300 feet of berth at a depth of 5 feet. One 6-inch pipeline connects with 3 storage tanks, having a total capacity of 4,285 barrels. This wharf has connections to the New Haven Railroad.

i. Opposite the two previously described wharves Mathewson Machine Works Inc. operates a small pile and timber wharf, which is used for the mooring of small company-owned boats, while engines are installed and tested.

20. The above described wharves abut the Federally improved channel below the Neponset Bridge. Above the bridge there are two boat repair facilities and three small marginal wharves which have no commercial significance.

Improvement Desired

21. For the purpose of determining the nature and extent of navigational improvement desired, a public hearing was held in the Quincy Y.M.C.A. auditorium on 28 January 1959. The hearing was well attended. Among those attending were representatives of Federal, State and local Governments, shipping interests, industrial interests, yacht clubs, and local interests.

22. The chief advocate of improvement was the Boston Edison Company. It submitted a statement citing the future need for deep draft navigation in the waterway. For its own needs, the company stated that electric power demand had steadily increased to such an extent, that additional generating facilities were needed in the locality. It predicted that the demand would continue to increase at a substantial rate. To supply the predicted future demand the company has decided to construct a new power plant at Squantum Point. The former Squantum Naval air facility has been acquired and plans completed for constructing an initial generating unit of 250,000 KW capacity. Plans envisage future construction of similar units, until the presently planned capacity of 1,000,000 KW is reached. The plants will be of a steam generating type, readily convertible to coal or oil, either of which fuel would be most economically transported by water. As justification for the estimates of future power needs the company cited recent growth. In 1945 its energy output was in the vicinity of about 2 billion kilowatt hours, while in 1958, 13 years later, it was about 4 billion kilowatt hours, approximately a 100 percent increase. Its capacity at the time of the hearing was about 1,081,000 kw. It estimated that the capacity will have to be doubled by 1970 with a further doubling by about 1985. To meet such increases the company has periodically increased its capacity, adding another 150,000 kw. in 1959, making a total present capacity of 1,231,000 kw. It was further stated that limited expansion can be made at its present sites on the Boston waterfront, but that this expansion will fall far short of expected demand. In addition, the distribution pattern of the power has changed to the point where power transmission costs would be more economical with a plant in the Dorchester Bay Area.

23. The company stated that its planning contains one major obstacle, fuel transportation costs. At present, fuel to its other plants is delivered by means of deep draft navigation, either colliers or tankers. Costs for delivering fuel at the Squantum site would be much higher in the present unimproved channel, since the fuel would have to rehandled at a deepwater

terminal and then barged to Squantum. Barge costs were cited as $0.12 per barrel or about $0.72 per ton for oil. Similar costs for coal were given. The company estimated savings of $372,000 in an improved channel during the first full year of operation of the initial generating unit, with ultimate savings of $1,160,000 annually when projected capacity is realized. It was further stated that all of these savings would be passed on to the consumer, since power costs, being under state regulation, are directly related to fuel costs.

24. The type of shipping that would be used in transporting fuel to the proposed site was shown. The company stated that standard colliers with dimensions of 443 to 456 feet in length, 58 to 62 feet in width, and 28-1/2 to 31 feet in draft would be used. The use of super colliers was also anticipated. Dimensions of these vessels are 635 feet long by 75-foot beam and a loaded summer draft of 32.5 feet. These vessels unload in about 12 hours. The type of tankers that will be used was not cited, but it is believed that future tanker deliveries would be the maximum size possible within the limitations of any channel provided.

25. To provide for this shipping the company requested a channel 250 to 300 feet wide, preferably 300 feet. A depth of 35 feet in the channel was requested, and a turning basin of a suitable depth for turning vessels so that the vessels could proceed outbound after unloading was also requested.

26. In addition to the Boston Edison Company, a few other industries abutting the waterway favored navigational improvement. One of these was the Gulf Oil Corporation. This company has a small bulk oil terminal at Commercial Point. Storage capacity is 18,500 barrels. A total of 215,000 barrels of fuel oil was delivered to this facility in 1958. The company stated that it had considerable room to enlarge its storage facilities. Future navigation to its terminal is anticipated to be in tankers drawing about 15 feet. Another industry, the O. G. Kelley Company, stated that its use of the waterway was increasing, because it was presently fabricating larger products which cannot be transported overland. The company fabricates large tanks. It anticipates future navigation needs will consist of sufficient depth for a towboat and barge. The Murray and Tregurtha Company, a subsidiary of the Mathewson Machine Works Inc. and a marine internal combustion motor company, also favored improvement. While this company does not ship or receive extensively by water, navigation is necessary for some of its testing equipment. Depths beyond the existing project depths were not

requested. Several other industries, not located on the waterway, were in favor of improvement, justifying its need on the basis of more economical power and increased power capacity for the locality.

27. Local interests also cited the area as one of the few remaining areas in Boston Harbor suitable for industrial expansion. Several other proponents of improvement stated that improvement of the waterway for deep draft navigation would attract a sufficient volume of industry to justify improvement. However, no concrete evidence of new industry was adduced either at the hearing or in subsequent contacts with local interests. The South Shore Chamber of Commerce was opposed to any improvement that would attract undesirable or obnoxious industry. It went further on record, citing the proposed power plant as a desirable industry.

Existing and Prospective Commerce

28. The sole reported item of commerce on the waterway was 34,971 tons of gas oil, and distillate fuel oil in 1958. This is intraport commerce, delivered by motor-barge from oil terminals in various other parts of Boston Harbor. All of the commerce is handled at Commercial Point. It has been relatively steady in volume for the past few years. Prior to 1952 the city of Boston had operated a loading station for refuse and waste materials. These materials were loaded on barges in Dorchester Bay and deposited in the city dump on Spectacle Island. The city has now enlarged its incinerator facilities and this traffic no longer exists.

29. As far as can be ascertained from local interests, presently prospective additional commerce resulting from improvement of the waterway will be destined to the proposed power plant. The company anticipates that it will utilize the full capacity of the planned initial 250,000 kw. generating unit immediately after improvement and that it will be utilizing its planned capacity of 4 units, or 1,000,000 kw., in 25 years. Anticipated annual fuel requirements for the plant with incremental rises for each additional generating unit were given. These requirements are detailed below:

Unit	Total Capacity Kilowatts	Estimated Annual Fuel Coal (Short tons)	Oil (Short tons)
1	250,000	690,000	517,000
2	500,000	1,255,000	920,000
3	750,000	1,722,880	1,292,000
4	1,000,000	2,145,000	1,610,000

The estimate of planned capacity of 1,000,000 kw. in 25 years, is considered possibly to be optimistic. However, it is conservatively estimated that full capacity will have certainly been achieved by the end of 50 years.

30. Local interests have indicated that the waterway with large marsh areas abutting it has a great potential for industrial expansion. While this is true, no evidence of immediate utilization of these areas has been tendered.

31. Commerce for the most recent 10-year period is shown in Table I.

TABLE I

YEAR	TONS	PASSENGERS
1949	92,297	12
1950	103,610	2,991
1951	75,463	11,482
1952	43,693	10,251
1953	18,793	11,685
1954	23,174	334
1955	34,763	188
1956	35,062	62
1957	38,761	124
1958	34,971	478

DETAILED STATEMENT OF COMMERCE (1958)

	Commodity	Tons (short)
Gas	Oil, distillate fuel oil	34,971

Vessel Traffic

32. Commercial navigation in the waterway is presently limited to small motor vessels and barge traffic. In 1958 the deepest draft vessel using the channel was a motor vessel drawing 13 feet. This vessel made 21 trips in 1958. Total reported vessel traffic in 1958 consisted of 239 trips. In addition to this traffic there is a considerable number of recreational boats which use the waterway during the summer recreational season. The greater portion of these boats are based above the Neponset River Bridge, in the State project, although a great many utilize the repair facilities and marina situated below the bridge.

33. Vessels expected to use the waterway in the event of improvement will be fuel carriers, either colliers or tankers. The colliers fall into two classes, regular and super colliers. Dimensions of the regular colliers, now most abundant in coastwise trade, are about 465 feet long, 62 feet wide with a loaded summer draft of 28-1/2 feet. These vessels have a cargo-carrying capacity of about 12,000 tons. Super colliers, recently introduced into the New England trade, are expected to supplant the regular colliers in the future. These vessels have an overall length of 634 feet, a width of 74 feet, and draw about 32.5 feet, loaded summer draft. They have a cargo capacity of about 24,000 tons, are self unloading, and have a turn around time of 12 hours. Since these colliers are able to deliver coal much more economically than the regular colliers, it is anticipated that they will be used exclusively in this trade, as the regular colliers become obsolete. It is estimated that tankers will range from the 26,000 deadweight ton class to the 46,000 dwt. type.

34. Tabulated below are the vessel trips for 1958. The 1958 trips represent about average commercial traffic. Recreational boating traffic averages approximately 15,000 trips annually.

TABLE NO. II

Trips and Drafts of Vessels (1958)

Draft in Feet	INBOUND					OUTBOUND				
	Self-Propelled Vessels			Non-self propelled vessels	Totals	Self-Propelled Vessels			Non-self propelled vessels	Totals
	Passenger and dry cargo	Tanker	Towboat or Tugboat	Tanker		Passenger and dry cargo	Tanker	Towboat or Tugboat	Tanker	
13		21			21					
12		4			4					
11				1	1					
9			2	1	3			2		2
8							22			22
7							3			3
6 or less	17				17	16			2	18
TOTAL	17	25	2	2	46	16	25	2	2	45
Total net Register Tonnage	203	12,942	50	890	14,085	193	12,942	50	890	14,075
Passengers					239					239

Difficulties Attending Navigation

35. For the present commerce no apparent difficulty exists in the 18- or 15-foot channels. Prospective deep draft commerce to the proposed power plant, and other industries which locate on the waterway would be unable to navigate because of insufficient channel width and depth. Prospective vessels carrying the commerce would range from 28-1/2 to 38 feet in draft and 443 to 700 or more feet in length. Minimum safe channel requirements for such vessels operating on the tide, are considered to be 300 feet wide, and a mean low water depth of 35 feet.

Water Power and Other Special Subjects

36. Flood control, water power irrigation, and pollution have no direct relation to this report. The considered improvement would not have any adverse effect on fish and wildlife.

Shoreline Changes

37. Investigation of the possibility of shoreline changes as an effect of improvement has been made. Except for fill to be acquired by the Company by spoil from hydraulic dredging it is considered that no change in the shoreline will result from the proposed improvement.

Plan of Improvement

38. In selection of an overall plan of improvement of the waterway, consideration was given to several factors. These factors included; the specific plan offered by local interests, the amount and type of commerce anticipated, and the types and drafts of vessels expected to carry this commerce.

39. The only specific plan of improvement was advanced by the Boston Edison Company. Essentially, it consists of a channel 35 feet deep, at least 250 feet wide, preferably 300 feet, generally along the line of the existing project. The deep channel would extend from the main 40-foot channel in Boston Harbor to the vicinity of Squantum Point, the site of the proposed power plant. An adequate turning and maneuvering basin at the inner terminus of the channel was also requested. Channel dimensions were predicated on future use of either colliers, with drafts ranging from 28.5 to 32.5 feet, or tankers with drafts ranging from 33 to 38 feet.

40. The layout of the proposed channel would follow closely the layout of the existing 18-foot project. Some deviation has been made in order to minimize excessive dredging, and provide for greater facility of navigation. A width of 300 feet was selected as the minimum in which deep-draft vessels could operate.

41. Studies of various depths were made. These studies included consideration of the sizes and types of vessels expected to be used in general coastwise commerce in fuels. In order to arrive at minimum channel requirements, authoritative forecasts of average size prospective fuel carriers were studied. The forecasts included those of a study made by the Board of Engineers for Rivers and Harbors in 1961. This study indicated that the average tanker of U. S. Registry in the year 2000 would be in the vicinity of 37,000 dwt. On this basis, it is conservatively estimated that the average tanker during project life, will be of the 37,000 dwt class. As this is an average, it is evident that larger vessels would be available at that time and would be used in this commerce. It is considered that the largest vessel to be used in this trade would be about in the 46,000 dwt class. These vessels draw about 38 feet loaded summer draft. For vessels of this class, a 35-foot channel would be necessary. Any lesser depth would preclude navigation for vessels of this type. These vessels will be subject to tidal delays, but further deepening beyond the 35-foot depth to eliminate these delays would not be justifiable economically. In addition, the 35-foot depth would reduce tidal delays for vessels drawing less than the maximum contemplated draft of 38 feet.

42. It is considered that the turning and maneuvering basin should be deepened to the same grade as the channel. Fully loaded vessels bound for the power plant will have to navigate through it to reach the dock. In addition, the turning and maneuvering basin will be necessary to maneuver ships to other locations where future industries may locate.

43. Studies were made also of deepening the present channel above the site of the proposed power plant to the Neponset Highway Bridge. However, it was found that the existing 15-foot channel to this location would suffice for the existing and presently foreseeable future commerce for this part of the waterway. Investigation was made also of that portion of the river lying above the Neponset Highway Bridge. It was found that the present 6-foot improved channel is ample for recreational craft, which at this time is the only navigational use made of this portion of the waterway. In view of the above, it is considered that the most adequate and economical improvement for the waterway would be a channel 300 feet wide and 35 feet deep extending from the main 40-foot ship channel in Boston Harbor about 2.9 miles to the vicinity of Squantum Point, together with a 35-foot deep turning basin and maneuvering basin located at the upper end of the proposed channel.

Required Aids to Navigation

44. The United States Coast Guard has been consulted on the need for additional aids to navigation, should improvement be effected.

This agency has indicated that a total of 6 additional buoys will be required. The buoys are estimated to cost about $12,000 initially, with annual maintenance costs of $1,000.

Estimates of First Costs

45. Estimates of first cost of the proposed plan of improvement have been made. Probing surveys indicate that no rock will be encountered in deepening to 35 feet. Dredging quantities are in terms of in-place measurement, with a 2-foot overdepth allowance, and 1 on 3 side slopes. It is anticipated that the work will be accomplished partly by hydraulic methods and partly by bucket dredging. About 900,000 cubic yards will be spoiled by hydraulic methods. Part of the spoil will be placed on the south side of Thompson's Island and the remainder on the north side of the Boston Edison Company's land at Squantum Point. The U. S. Fish and Wildlife Service has indicated that the use of other nearby marsh areas would be unsuitable for spoil. For this reason it is considered that the remaining dredged materials should be disposed at sea. The U. S. Fish and Wildlife Service reports are contained in Appendix "C". Dredging prices reflect 1961 price levels, based on recent prices on similar contracts, and are adjusted to include allowances for hydraulic methods.

Project Construction

Federal

Corps of Engineers

Dredging Channel 300 feet wide, 35 feet deep		$5,010,000	
Dredging Turning Basin 33 Acres, 35 feet deep		770,000	
	Total		$5,780,000
Contingencies		850,000	
	Total		6,630,000
Engineering and Design		35,000	
Supervision and Administration		385,000	
	Total		$7,050,000
Pre-Authorization Studies		23,000	

U. S. Coast Guard

Additional Aids to Navigation		12,000	
	Total Federal Costs		$7,085,000

Non-Federal

Dredging Berth and Approach Channel		$ 315,000	
	Total Non-Federal Cost		$ 315,000
	Total Project Construction Cost		$7,400,000

Estimates of Annual Charges

46. Estimates of annual charges have been made for the proposed plan of improvement. Additional maintenance costs are based on experiences in shoaling in the existing project, adjusted to the dimensions of the proposed plan of improvement.

47. The estimated annual charges have been computed for an assumed 100-year anticipated life of the project at interest rates of 2.625 percent Federal and 4 percent local. The annual charges have been computed on the basis that the total cost of improvement of the channel and basin will be borne by the United States and the costs of approach channel and berth will be borne by local interests.

Federal Investment

Corps of Engineers	
Channel and basin (dredging)	$7,050,000
Pre-Authorization Studies	23,000
	$7,073,000
U. S. Coast Guard	
Aid to Navigation	12,000
Total Federal Investment	$7,085,000

Non-Federal Investment

Local Interests	
Dredging Berth	$ 315,000
Total Non-Federal Investment	$ 315,000
Total Investment	$7,400,000

Federal Annual Charges

Corps of Engineers	
Interest (7,085,000 x .02625)	$ 186,000
Amortization (7,085,000 x .00213)	15,000
Additional Annual Maintenance	
(Channel and Basin)	10,000
(Aids to Navigation)	1,000
	$ 212,000

Non-Federal Annual Charges

Local Interests	
Interest (315,000 x .04)	$ 12,550
Amortization (315,000 x .00081)	250
	$ 12,800
Total Annual Charges	$ 224,800

Estimates of Benefits

48. Benefits, attributable to improvement of the channel and basin, will be realized from the prospective fuel commerce destined to the power plant. Either coal or oil will be used at various times during the project life. Such use will depend on several factors, among which are, economy, availability, and regulation of supply. The power plant will be so designed that conversion to the use of either fuel can be made readily. As there is no indication at this time that any deep draft commerce in addition to the prospective commerce to the power plant will result from improvement, all of the benefits will be estimated for the power plant commerce. The benefits for each type of fuel will be estimated on a 100-year use basis and lesser of the two used in justification of improvement.

49. Boston Edison Company has indicated in rather broad terms its construction schedule for the ultimate 4-unit power plant. It stated that construction on the first 250,000 k.w. unit will be initiated as soon as dredging is assured. For the basis of its forecasts, the company cited its record between the years 1945 and 1958, in which its energy output about doubled from 2 billion to 4 billion kilowatt-hours. It further stated that its capacity in 1958 was 1,081,000 kilowatts, with an additional 150,000 kilowatt capacity scheduled for completion in 1959. With regard to these figures, the company estimated that capacity requirements would double by the mid 1970's and double again by the mid-1980's. On this basis, the total capacity of the company would aggregate about 4,900,000 kilowatts by that time. It is considered that all of the expansion would not occur at the proposed site. Such factors as economics of distribution, operation, and load requirements would necessitate expansion of present facilities or establishment of new facilities in other areas. However, since the proposed site contains the most room for development, and is in an area of rapid industrial development, it is considered that the company's claim of an ultimate 1,000,000 kilowatt capacity plant is definitely reasonable. The Federal Power Commission forecasts for the area in which the company is located, Area No. 2 Massachusetts, corroborate within reasonable limits the company's forecasts of power requirements. Therefore, for the purpose of this report, it is estimated that the first unit will be in operation immediately after improvement

and the remaining 3 units installed sometime within a 50-year period. Owing to the impossibility of projecting specific dates of construction, benefits for the first unit will be estimated for the entire project life, and benefits for the remaining 3 units reduced to an annual average equivalent of uniform growth for a 50-year period, and remain relatively stable thereafter.

50. Should oil be used as fuel, transportation costs with the present channel limitations would be comparatively high in relation to similar power plant installations in the locality. This condition stems from the fact that the present channel depths and widths are insufficient to allow passage of the regular coastwise tankers engaged in the fuel oil trade. Consequently, oil deliveries would of necessity have to be made in towed or self-propelled barges. This operation would involve extra costs and rehandling charges. Barging oil is now made by one terminal company, Gulf Oil Co. Its major terminal is located on Chelsea River and it uses the river terminal as a truck distribution site for the southern area of Boston. Apparently this operation is satisfactory for the current annual volume of commerce. Such volume is comparatively small and not of sufficient magnitude to justify any consideration of deeper draft navigation. However, for the volume of prospective commerce to the proposed plant, the additional costs involved in rehandling and barging operations would be excessive. Such excessive costs, if allowed to prevail, would be reflected in higher power costs for the tributary area.

51. In Boston Harbor, barge transportation of petroleum and its products is handled by one independent firm, the Boston Fuel Transport Company. Its primary function consists of servicing waterfront industries with fuel oil, transferring oil between terminals, and bunkering ships with fuel. The company has standard rates for transporting the oil, regardless of volume. The price for barging residual oil within the confines of the upper harbor is $0.10 per barrel. Between the upper and lower harbor, an additional price of $0.02 per barrel is charged. The power plant's location would be in the lower harbor. Thus, at prevailing rates, the actual cost of fuel oil would be at least $0.12 per barrel higher than delivery by deep draft tanker. This would amount to $0.72 per ton, residual oil averaging about 6 barrels per ton. As, at the present time, this is such a small volume of such trade in comparison with the prospective commerce in Dorchester Bay, it appears that a somewhat lower cost could be attained, either by contract or by the company providing its own service. Estimates of barge transportation, using a 1000 ton self propelled barge appear to indicate that this cost could be reduced by about 16-2/3 percent, or to a figure of $0.60 per ton.

52. Should improvement be effected by provision of a 35-foot channel, it is considered that delivery to the plant will be made

by means of coastwise vessels of types expected to deliver such products to similar terminals in Boston Harbor. The sizes of these vessels are anticipated to range from 26,000 to 46,000 deadweight tons. None of these vessels could navigate the waterway under present conditions, as channel widths and depths preclude navigation by them. With improvement, all of them could navigate the waterway with attendant tidal delays. As the drafts of these vessels range from 33 to 38 feet, it is evident with a mean tidal range of 9.5 feet the vessels could navigate a 35-foot channel at favorable tidal periods. As stated previously, without channel improvement, barging will be necessary. With channel improvement, such barging will be unnecessary, and deep draft tankers would deliver directly to the power plant. Therefore, it is considered that elimination of the rehandling and barging costs will be a direct benefit attributable to deepening of the channel. As stated previously in the section on "Commerce", 517,000 tons of oil are expected to be delivered to the plant immediately after improvement and continue annually thereafter. The savings in transportation costs will be $0.60 x 517,000, or $310,200. For the remaining tonnage of oil, 1,093,000 to be used when additional units are installed, the transportation savings will be $0.60 x 1,093,000, or $655,800. Since these benefits will be realized by the end of a 50-year period and continue annually thereafter, the benefits are reduced to their annual average equivalent. Computation of this amount results in $655,800 x .53286, or $349,400, an annual benefit. This evaluation of benefits is considered very conservative, and is considered to be the minimum obtainable. This consideration is based on the fact that it is believed that the plant will have reached its ultimate capacity in 50 years and that any attempt to project specific dates of installation would be highly conjectural. The sum of the two estimates $310,200 + $349,400, or $659,600 would be an annual benefit attributable to channel improvement and provision of a turning and maneuvering basin.

53. Savings in transportation costs have been estimated for the use of coal. At the present time, there is very little movement of coal by barge in the harbor. Small amounts of coal destined for municipal and metropolitan pumping and sewer stations are moved in this trade. No scheduled price per ton is available at this time. The prices quoted by firms handling such tonnage range from $2.00 to $3.00 per ton. Estimates of cost for barging the coal have been made. It is considered that the coal could be delivered in 1200 ton barges towed to the site. Delivery could be made in lots of 2 or 3 barges. Estimates of the cost of transporting the coal by this procedure reveal that such costs would be about $0.525 per ton.

54. In the event that coal is used exclusively, the transportation savings to be realized would accrue in part from the estimated 690,000 tons of coal needed for the first generating unit. For this

volume, the savings would be 690,000 x $0.525 or $362,200 to be realized from the elimination of barging costs. As estimated previously for oil this benefit will be realized immediately after improvement and continue thereafter during project life. Therefore, the entire $362,200 is considered to be an annual benefit. The remaining tonnage for the additional 3 units would amount to 1,455,000 tons by 50 years and continue annually thereafter. The savings to be realized from this tonnage would amount to 1,455,000 x $0.525 or $763,875. This benefit, reduced to its annual average equivalent of 2.625 percent, would be $763,875 x .53286, or $407,000. This amount is considered an annual benefit. For the use of coal, exclusively, the total benefits will be $362,200 + $407,000 or $769,200.

55. All of the previously estimated benefits have been estimated for a 35-foot channel in the waterway. Additional benefits would result from provision of a 40-foot channel. The 40-foot channel would eliminate or reduce the tidal delays encountered by the vessels considered for the 35-foot channel. An estimate of the savings to be realized for the 40-foot channel has been made. For the types of vessels expected to use the waterway, the savings to be realized from elimination or reduction of tidal delays have been estimated to average about $0.014 per ton. The savings to be realized from the use of oil would thus be 517,000 x $0.014 or $7,250. This saving would be realized immediately after improvement and continue thereafter. Therefore, it is considered an annual benefit. The remaining 1,093,000 tons to be used by the end of project life would generate a savings equal to 1,093,000 x $0.014 or $15,300. This amount, reduced to its annual average equivalent equals $15,300 x .53286 or $8,150. The sum of the two $7,250 + $8,150 results in an annual benefit of $15,400 attributable to the deepening of the channel from 35 to 40 feet.

56. In similar fashion, coal commerce benefits for the 35-foot channel have been estimated. The 690,000 tons of coal, to be used annually after improvement is effected, could be transported more economically in the deeper channel. Savings in this respect would amount to $0.014 x 690,000 or $9,660. Savings for the remaining tonnage, expected to be used by the end of project life, would amount to 1,455,000 x $0.014 or $20,370. This amount reduced to its annual average equivalent equals $20,370 x .53286 or $10,840, an annual benefit. The sum of the two benefits thus estimated $9,660 + $10,840 equals $20,500 annual benefit attributable to deepening from 35 to 40 feet.

Summary of Benefits

Generating Units	35-Foot Channel Coal	35-Foot Channel Oil	40-Foot Channel (Incremental) Coal	40-Foot Channel (Incremental) Oil
1	$362,200	$310,200	$ 9,660	$ 7,250
3	407,000	349,400	10,840	8,150
4	$769,200	$659,600	$20,500	$15,400

57. The Boston Edison Company indicated it would use a portion of the dredged materials for reclamation of a portion of the intertidal flats, which form part of the original tract of land acquired for the proposed plant. Reclamation of about 122 acres is planned. Costs of bulkheading to retain the fill was estimated as $750,000, which would result in a cost of about $6,150 per acre for the land thus reclaimed. The original cost of acquisition of the entire tract was $910,000 of which about 202 acres were usable at an elevation of 12.0 feet or over and the remaining 386 acres marshland and intertidal flats. At current prices, it was estimated that the value of the marginal land was about $102,000. Subtracting this value from the original $910,000 paid for the tract reveals that the 202 acres had a value of $808,000 or $4,000 per acre. This value compared with the $6,150 per acre cost of reclaiming the land reveals that cost of diking to enable the land enhancement would be more costly than the original land value, therefore, no benefits were evaluated from this source. The difference of $2,150 per acre is considered to be a necessary cost of construction of the plant and part of the capital outlay for construction. It is further considered that any reduction in reclaimed land would not affect the unit cost of reclamation.

Comparison of Benefits to Costs

58. Comparison of the estimated annual benefits of $659,600 to estimated annual charges of $224,800 results in a benefit-cost ratio of 2.9 for the 35-foot channel and turning basin.

Proposed Local Cooperation

59. The benefits, estimated to result from improvement are considered general in nature. The estimated benefits are based on transportation of fuel to a power plant which is a public utility, incorporated under the laws of the Commonwealth of Massachusetts. Such utilities are subject to power rate regulation, which recognize fuel costs in determination of power rates. Therefore, it is considered that the benefits will accrue to the entire tributary area,

making them general in nature. In addition, there are lands available for industrial expansion in the area, which it is considered, will be utilized in the event of improvement. However, it is considered that local interests should be required to construct the first 250,000 kw unit of the plant prior to or in conjunction with channel improvement, and dredge an approach channel and berth to a depth commensurate with channel and basin depths. Such dredging is presently estimated at $315,000. Local interests have indicated that a portion of the dredged materials may be utilized for filling of adjacent land areas. If it is determined, after detailed studies, that additional spoil areas are necessary, local interests should, upon request of the Chief of Engineers and without cost to the United States, furnish any such areas required. The furnished areas should include such dikes, bulkheads and embankments as may be necessary for the initial construction and subsequent maintenance. In addition, local interests should hold and save the United States free from damage that may result from the construction works, and provide, without cost to the United States, all lands, easements, and rights-of-way necessary for construction of the project. The Commonwealth of Massachusetts has provided reasonable assurances that these requirements will be met.

Coordination with Other Agencies

60. All Federal, State, and local Government agencies, that would be concerned with the waterway were notified of the public hearing held at the Quincy Y.M.C.A. auditorium on 28 January 1959. Subsequently, discussions were held with representatives of the city of Quincy, the Maritime Association of Greater Boston, the Boston Edison Company and various shipping interests. The Federal Power Commission was consulted, relative to power forecasts made. The Commission stated that the forecasts made by the Company appeared reasonably comparable to its 1980 forecasts made for Area No. 2 (New England) in which the proposed plant will be located. The U. S. Fish and Wildlife Service and its parallel State agencies were consulted on the study and its conclusions. Fish and Wildlife reports are contained in Appendix "C".

Discussion

61. From the standpoint of existing commerce, Dorchester Bay - Neponset River is a relatively minor waterway within the confines of Boston Harbor. It forms the boundary between the cities of Boston and Quincy. The Boston shore on the left bank has, in the past, been the locale of somewhat extensive commercial activity. This activity has declined in recent years. The only reported commerce consists of gas oil, and distillate fuel oil, of which 34,971 tons were received in 1958. The Quincy shore is largely undeveloped, having but one comparatively small industry on it.

62. Quincy interests claim that one of the chief factors retarding industrial expansion in the locality, lies in its existing 18- and 15-foot channels, which preclude any commerce in deep draft vessels. Another deterrent, which existed formerly has been partly resolved. This condition resulted from the inability to use land occupied by a U. S. Navy air facility. About 600 acres of land in the vicinity of Squantum Point were thus occupied. The U. S. Navy discontinued operation at the facility and the land was recently acquired by the Boston Edison Company, an electrical power company serving the greater portion of Metropolitan Boston.

63. The power company, in citing its own justification of acquiring this site for the expansion of its power facilities, gave several reasons for its action. The plant would be centrally located with respect to its other deep water plants. The location, in the city of Quincy, is in a municipality which has made great strides in industrial growth in recent years. This growth is expected to continue. Therefore, the most economical location for the plant will be in an area in which the greatest demand will prevail. Should any other area be utilized problems of power distribution, fuel supply and other factors will combine to increase generating costs, which, in turn will result in higher power rates for the consumer. The company stated also that expansion of its existing deep water facilities is limited and could not provide sufficient generation for the anticipated demand.

64. Forecasts of the anticipated demand were tendered by the Company. It cited its supply as about 4 billion kilowatt hours in 1958. This amount was almost 100 percent over the 1945 supply. Its generating capacity in the first part of 1959 was stated to be 1,081,000, with an additional 150,000 kilowatt capacity scheduled for completion in the summer of 1959. On the basis of this record, the Company estimated its capacity requirements should reach at least 2 million kilowatts by 1970 and to double that figure by the mid-1980's. The Federal Power Commission was consulted on these estimates. It stated that the agency does not prepare long-term estimates for individual systems, but that Boston Edison was located in Power Supply Area No. 2 (New England less Maine) for which a forecast of the 1980 requirements was given. It was further stated that Boston Edison requirements were reasonably comparable to the overall requirements of the area. Comparison of the Federal Power Commission's estimated increase for the area with the Boston Edison Company's forecast indicated that the power company's forecast was reasonable. Therefore, the estimated fuel requirements for such increases were taken as anticipated commerce on the waterway.

65. The plan of improvement was based on the type, size, and drafts of vessels expected to carry the anticipated commerce in the waterway. From studies of comparable commerce in other waterways

and forecasts by shipping interests it was estimated that the vessels would range from 26,000 to 46,000 deadweight tons, with drafts ranging from 33 to 38 feet. For these vessels, a 35-foot deep channel is considered to be minimum. All of these vessels will be subject to varying degrees of tidal delay in a 35-foot channel. Deeper channels were considered. The incremental costs of providing deeper channels were found not to be economically justifiable for the volume of commerce expected. Therefore, the 35-foot channel was selected as the most feasible for this waterway. It is considered that an essential part of improvement will be provision of a turning basin and maneuvering basin to enable the maneuvering of ships for docking at the power plant and other anticipated users in the area which would utilize the waterway.

66. Benefits were estimated for the commerce anticipated to be carried in the waterway. As it was found that the only commerce, specifically foreseeable at this time, would be that required for the proposed power plant, benefits were estimated for this commerce alone. Benefits were based on savings in transportation costs made possible by deepening the channel to receive the larger ships. In lieu of deepening, all fuel would have to be delivered by barge or small motor vessels, with consequent higher transportation costs. The differences in costs were estimated, consideration being made of various factors such as tidal delays for the larger ships, and lesser costs for barging than current costs in view of the larger volume. As either coal or oil will be used for fuel, benefits were estimated for the savings to be derived from each type of fuel, if used exclusively throughout the entire project life. Estimated benefits total $659,600 annually for oil, and $769,200 for coal.

67. The benefits, thus estimated, will result from traffic in fuel to a power plant, subject to public regulation. Under such regulation, it is noted that savings in transportation costs of fuel are reflected in reduced power rates for the locality. In addition, there are existing areas on the waterway that are expected to attract industries, which require deep draft channels. Therefore, the benefits resulting from the proposed improvement are considered to be general in nature. However, local interests should be required to provide approach channels and berths commensurate with channel depths. The estimated Federal cost (1961) of construction is $7,050,000. Additional Federal costs include $23,000 for pre-authorization studies and $12,000 for additional aids to navigation. Additional annual maintenance is estimated at $10,000. Required costs to local interests are estimated (1961) to be $315,000 for dredging an approach channel and berth. Estimated annual benefits of $659,600 compared to estimated annual charges of $224,800 result in a benefit-cost ratio of 2.9.

68. Improvement of the waterway will result in substantial benefits which will be directly attributed to navigation itself. The

benefits will accrue to the locality in which the proposed plant will be located. These benefits are considered to result from reduced power rates, resulting from location of the power plant in its proposed site. The site is strategically sound insofar as distribution and transmission costs are concerned. Expansion of existing plants in more remote areas would result in higher distribution and transmission costs than could be available at the present site. These costs would be reflected in higher power rates for the locality. The benefits attributable to more economical distribution costs, combined with the benefits estimated to result from provision of deep draft channels, with consequent economical fuel costs are believed to be the basis for the Company's selection of the site. It is conceivable that without improvement, the Company would be in a less competitive position with respect to power rates than other localities. In turn, the higher power rates would tend to decelerate the rapid industrial growth which the area has enjoyed in recent years and probably further tend to encourage relocation of some of the present industries to other areas with more economical power. Therefore, it is believed that without improvement, the locality would not be in a position to sustain its hitherto favorable rate of growth.

Conclusion

69. Although present vessel traffic does not justify modification of the existing project, the Division Engineer concludes that present depths in the 18- and 15-foot channels would be inadequate for the waterway's anticipated commerce. He believes that the existing project for Dorchester Bay - Neponset River should be modified to provide adequate navigational facilities for the vessels, which will carry the anticipated commerce to the proposed power plant and other anticipated users. He considers the proper modification to consist of a channel 300 feet wide and 35-feet deep extending generally along the alignment of the existing project from the main 40-foot Boston Harbor channel to a line opposite Squantum Point. He further considers that a turning basin of about 33 acres and 35 feet deep should also be part of the modification. The modification can be accomplished at an initial construction cost of $7,400,000, including pre-authorization study costs of $23,000, additional aids to navigation costs of $12,000 and local costs of $315,000 for approach channel and berth. Since the benefits to be realized from improvement are general in nature, the Division Engineer concludes that the initial construction cost of the Federal project, presently estimated at $7,050,000 (1961), should be entirely borne by the United States. The total cost to the United States for the improvement would be $7,050,000 (1961) for construction plus $23,000 for pre-authorization studies and $12,000 for additional required aids to navigation. The ratio of 2.9 to 1 for evaluated benefits to estimated annual charges indicates decisive economic justification of the project.

Recommendation

70. The Division Engineer recommends that the existing project for Dorchester Bay - Neponset River be modified to provide for a channel, 35 feet deep and 300 feet wide, extending from the Boston Harbor 40-foot main channel to a line in the vicinity of Squantum Point, a distance of about 3 miles; a turning basin 35 feet deep and 33 acres in area; all at an estimated cost of $7,400,000, including local costs of $315,000 for an approach channel and berth, and Federal pre-authorization study costs of $21,000 and costs of additional aids to navigation of $12,000. Recommendation is made subject to the requirements that no work be accomplished until local interests agree to

a. Construct the first 250,000 kilowatt unit of the proposed power plant, the construction to be accomplished prior to or in conjunction with construction of the navigational improvement;

b. Provide an approach channel and berth at the proposed power plant facility, with depths commensurate with recommended project depth (estimated 1961 cost $315,000);

c. Hold and save the United States free from damages resulting from construction of the improvements;

d. Obtain all lands, easements, and rights-of-way necessary for construction and maintenance of aids to navigation; and

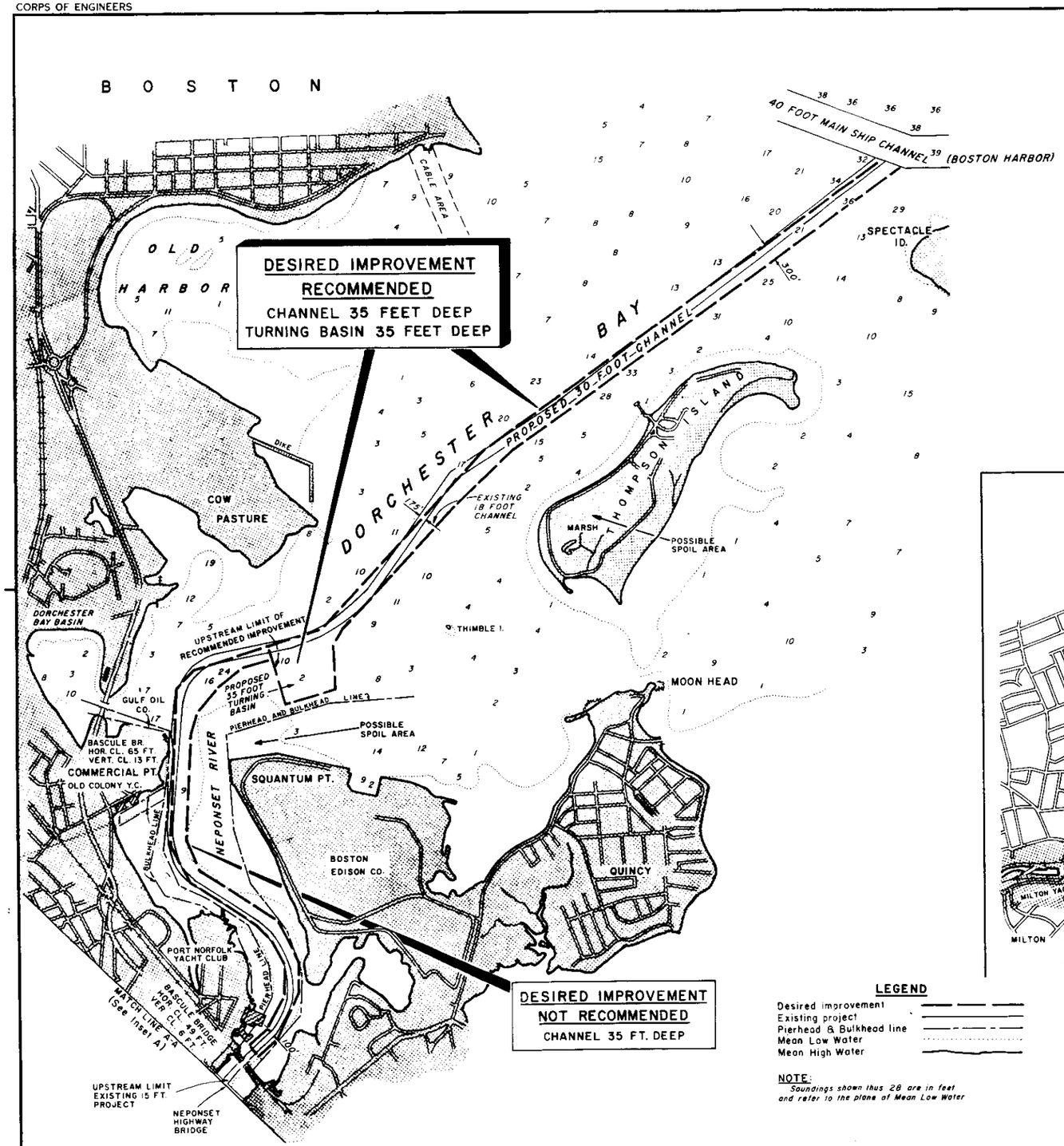
e. Furnish spoil areas, if it is determined after detailed studies that such areas are necessary, and without cost to the United States furnish any such areas required, including such dikes, bulkheads, and embankments as may be necessary for construction and maintenance of the project.

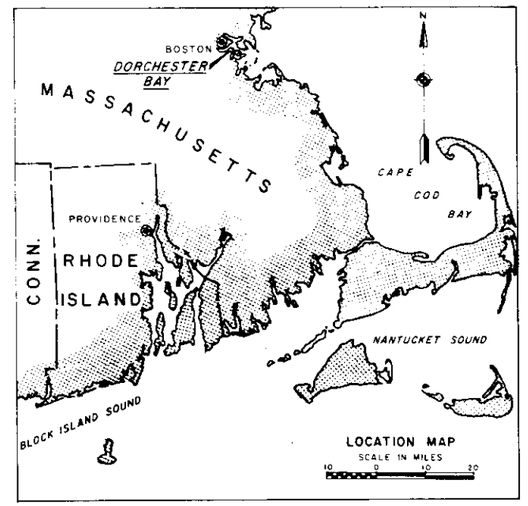
The total cost to the United States for this project modification is $7,050,000 for construction, with additional annual channel maintenance of $10,000.

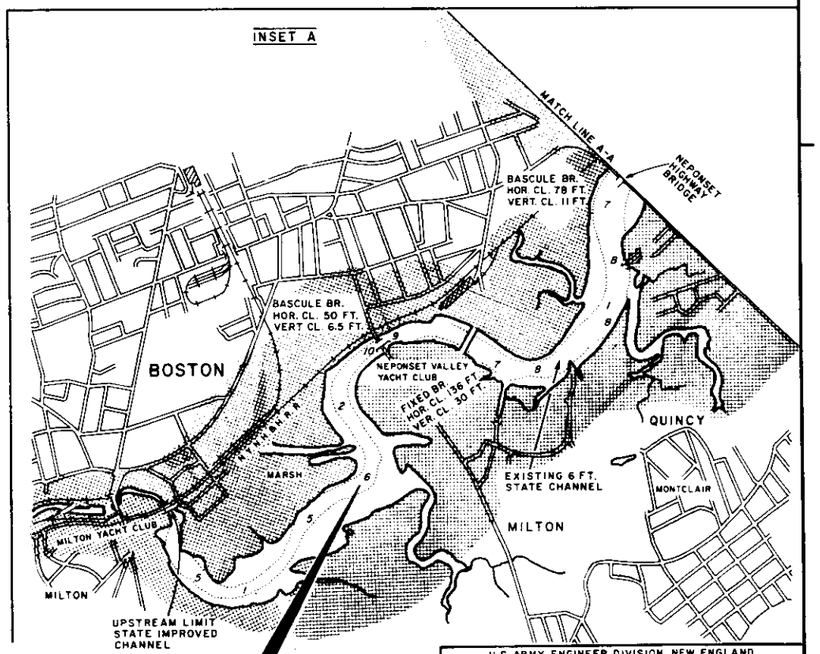
OTTO J. ROHDE
Colonel, Corps of Engineers
Acting Division Engineer

CORPS OF ENGINEERS

U. S. ARMY







LEGEND

Desired improvement
Existing project
Pierhead & Bulkhead line
Mean Low Water
Mean High Water

NOTE:
Soundings shown thus 26 are in feet and refer to the plane of Mean Low Water

U.S. ARMY, ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.

DORCHESTER BAY & NEPONSET RIVER MASSACHUSETTS

SHEET 1 OF 1 — SCALE IN FEET 1000 0 1000 2000 3000 — MAY 1961

APPROVED:

SUBMITTED:

TO ACCOMPANY SURVEY REPORT DATED: OCT. 13, 1961

FILE NO. 125 Dr. 40

REV. 10-61

PLATE NO. 1

APPENDIX A

ESTIMATES OF FIRST COSTS

1. Estimates of first costs are detailed below. Federal construction consists of widening to 300 feet and deepening to 35 feet the present channel. The channel would extend from the 40-foot main ship channel in Boston Harbor to the vicinity of Squantum Point, a distance of about 3 miles. Included in Federal construction is a turning basin of approximately 33 acres to be deepened to 35 feet. Local interests are required to dredge an entrance channel and berth to accommodate the anticipated commerce to the proposed power plant. The United States Coast Guard will provide required additional aids to navigation.

2. Probings and borings made during the study indicate that the materials to be removed consist of mud, sand and gravel. Ledge rock is not expected to be encountered. It is anticipated that spoil will be partly disposed at sea and partly disposed by hydraulic methods, the materials to be used by the company in land fill for plant construction. It is further anticipated that all of the required dredging by local interests will be used in plant construction.

3. Dredging quantities are in terms of in-place measurement, include an allowance of 2 feet of overdepth, and required side slopes of 1 vertical to 3 horizontal. Cost estimates are based on prices prevailing in 1961 and include allowances for hydraulic dredging.

4. The detailed estimate of costs is shown in the following tabulation:

PROJECT COST ESTIMATE

Cost Account Number		Cost Estimate (000) (May 1961)
09	CHANNELS	
	35' Channel, and Basin	
	Dredging (4,750,000 cubic yards of mud, Clay, sand, and gravel @ $1.22)	$5,780.0
	Contingencies @ 15%	850.0
		$6,630.0

Cost Account Number		Cost Estimate (000) (May 1961)
	Aids to Navigation (U. S. Coast Guard)	12.0
29	PRE-AUTHORIZATION STUDIES	23.0
30	ENGINEERING AND DESIGN	35.0
31	SUPERVISION AND ADMINISTRATION	385.0
	TOTAL COSTS (Corps of Engineers and U. S. Coast Guard)	$7,085.0
	Non-Federal Contributions	0.0
	TOTAL NON-FEDERAL COSTS	
	Lands and Damages 0	
	Relocations 0	
	Other (1)	
	Berth and Approach Channel	$ 315.0
		$ 315.0

SUMMARY OF ESTIMATED COSTS

Federal Cost	
Corps of Engineers	$7,073.0
Coast Guard	12.0
	$7,085.0
Required non-Federal Costs	
Berth	$ 315.0
TOTAL FEDERAL AND REQUIRED NON-FEDERAL COSTS	$7,400.0

APPENDIX B

ESTIMATES OF BENEFITS

1. Benefits to result from navigational improvement of the Dorchester Bay - Neponset River will be derived from savings in transportation costs. The savings will be realized from the ability to carry the anticipated commerce on the waterway in larger ships. As stated in the report, the anticipated commerce will be fuel, destined to the proposed power plant. The fuel will be either coal or residual fuel oil, dependent on current economies and availability of either fuel during specific intervals in the project life. For the purpose of this report, benefits will be computed for each individual fuel through the entire project life. The type of fuel producing the lesser benefits will be used exclusively in computation of the final benefit-cost ratio, as it is believed that forecasts of the extent of the use of either fuel would be relatively impossible at this time. Such procedure will result in a conservative estimate of economic justification. However, it is believed that the incremental difference between benefit evaluations for either fuel would not be of sufficient magnitude to affect materially the final determination of economic feasibility of the project.

2. Commerce in fuel, either coal or oil, is expected to be substantial upon completion of the initial 250,000 k.w. unit of the power plant, at which time navigation improvement, if authorized, is expected to be completed. The unit will be first of four 250-k.w. generating units that the Company will install. The 3 remaining units will be installed at some future times within the first 50 years of the project life of 100 years. The company's estimates for the entire 4 units are shown below. These estimates have been checked and found to be reasonable. The estimates are detailed below.

Unit	Capacity	Total Capacity	Estimated Fuel Requirements (Tons)	
			Coal	Oil
1	250,000 kw	250,000 kw	690,000	517,000
2	"	500,000	1,255,000	920,000
3	"	750,000	1,722,000	1,292,000
4	"	1,000,000	2,145,000	1,610,000

3. For the commerce in fuel, described above, the 15- and 18-foot channels are considered inadequate and conducive to higher transportation costs. These costs would result from the necessity of having to rehandle the fuel from deep draft terminals elsewhere in Boston Harbor. The fuel would then be transferred to towed barges in the case of coal, and self-propelled barges or towed barges, in the case of oil. Such rehandling and towing charges would add measurably to the final costs of such fuels, in comparison with costs for similar fuels in deeper sections of the harbor. With provision of a deep draft channel in the waterway, these costs could be eliminated, resulting in lower fuel costs for the power plant. Since power rates in the locality are regulated with respect to costs of production, it is considered that the savings to be gained from transportation costs in fuel would be reflected in lower power rates for the area.

4. Prior to initiation of the study concerning the benefits to water borne commerce, it was deemed necessary to explore the probability and extent of future power demand in the locality. As the Boston Edison Company had made specific forecasts of such power demand, it was felt that these claims should be corroborated if possible. To that effect the Federal Power Commission was requested to give its views concerning this company's future power demand. The Commission in its reply stated that it does not prepare long-term estimates for individual systems. It did state that, for the purposes of the navigation study, the expected overall growth of the company could be taken as reasonably comparable to that of Power Supply Area 2, the area in which the company is located. Power Supply Area No. 2 encompasses all of New England, except Maine. The Area and Company's 1959 power requirements are shown below, together with a forecast of the area's estimated future requirements for 1980.

Power Supply Area 2	1959	1980
Energy for Load, million kwh	26,205	76,000
Peak Demand, thousand kwh	5,482	15,170
Load Factor, percent	54.6	57.2
Boston Edison Company		
Energy for Load, million kwh	4,381	(12,706)
Peak Demand, thousand kwh	970	(2,684)
Load Factor, percent	51.6	(54.1)

* Figures in parenthesis represent projected requirements based on straight proportion. (C of E)

5. Based on the foregoing figures, it is apparent that Boston Edison Company's 1959 peak demand amounted to about 90 percent of its capacity of 1,081,000 k.w., cited at the hearing in 1958. It is not believed that an additional new plant construction of 150,000 k.w. also claimed by the company to be added in the summer of 1959 could have been completed in time to make an appreciable effect on reducing this percentage. With a peak demand of 90 percent of capacity and an expanding power market, it is considered that the Boston Edison Company must increase its plant capacity beyond the 1,231,000 k.w. it now has. This consideration is based on the above projected figures for 1980 which show an expected peak demand in that year of 2,684,000 k.w. for the company. Under such conditions, it is apparent that the Company would have to possess about 3,000,000 k.w. generating capacity to supply 90 percent of the peak demand for that year. It is believed in fact that, in consideration of such factors of maintenance, breakdowns, etc., a capacity of considerably more than 3,000,000 k.w. would be required. The entire anticipated expansion is not expected to materialize at the Squantum site. However, in view of the critical need for additional generating capacity, it may be reasonably assumed that the first unit of 250,000 k.w. will have been installed at the proposed site in conjunction with expansion of existing generating plants. It is possible that the first 2 units would be installed by 1980. However, for the purposes of this report, it was considered that, since the capacity situation is critical, at least one unit would be installed, coincidental with completion of navigation project, and the remaining 3 units at uniform intervals during a 50-year period, the final unit being installed by the 50th year. In view of the necessity of additional generating capacity, the strategic locality of the site, and the Company's investment of about a million dollars in costs, it is considered that the plant will be constructed with or without navigational improvement.

6. In oil burning generating plants, residual oil is the type of fuel generally used. This fuel is carried to Boston Harbor in ocean-going vessels, the chief supply coming from foreign sources. In 1959, about 81 percent of residual fuel oil was imported. The remaining 19 percent was carried in coastwise domestic deep draft traffic. The type of vessels presently carrying this traffic ranges from T-2^{s}, with cargo carrying capacities of about 17,000 short tons to 32,000 deadweight ton class with a cargo capacity of about 34,000 short tons. Loaded summer drafts of these vessels range from 30 to 34 feet. With the trend to larger vessels in this type of commerce, it is anticipated that future vessels in this trade will range from 26,000 to 46,000 deadweight tons. None of these types could navigate the present channel. Since future vessel traffic will have 33- to 38-foot draft, it is considered that the minimum design channel depth would of necessity have to be 35 feet. This design depth, in a locality having a mean tide range of 9.6 feet, will allow navigation of vessels drawing about 38 feet over

high water periods. The channel depth is predicated on the basis of a necessary clearance of 5 feet between the bottom of the hull and the channel bottom.

7. Bituminous coal used for fuel in Boston almost entirely originates in West Virginia or western Pennsylvania. The coal is shipped by rail to an east coast port, usually Norfolk, Virginia. It is then transferred to colliers and transhipped by water. The colliers for the most part are 10,000 to 12,000 dwt vessels. The Boston Edison Company in its brief at the public hearing quoted a price of $1.80 per ton for water delivery to Boston. It also cited the price of all-rail transportation versus rail-water transportation to Boston. The all-rail rate versus the rail-water rate averaged $0.54 to $0.74 higher per ton. Thus the rail-water method universally employed in Boston is considered the most economical method, and would be used exclusively in this type of trade. The rail-water cost is based on reception in Boston in deep draft vessel terminals. The company's estimates of costs have been investigated and found to be reasonable. The type of carriers used in present traffic are colliers ranging from 10,000 to 12,000 dwt. A new type of collier has been developed, one of which is now in the New England trade. This collier has a cargo capacity of about 24,000 tons. Future coal commerce is expected to be carried in this type of collier. The chief deterrent to universal use of this type is the inability of some of the terminals, to receive them. It is not anticipated that the terminal to be developed at Squantum will face this situation. Drafts of the various types of colliers range from 28 to 31 feet for regular colliers and 32-1/2 feet for super colliers.

8. Commerce in Dorchester Bay - Neponset River will be carried in the type of vessel described above in the event of navigational improvement. Without improvement, commerce will be carried in either towed barges or small self propelled motor barges. In such event, transportation costs will be relatively high. Present rates for such oil traffic in Boston Harbor range from 10 to 12 cents per barrel. From the upper harbor to the Dorchester Bay area the higher rate prevails. Residual fuel oil weighing about 6 barrels per ton, would average about $0.72 per ton at these rates. However, the rates are predicated on the comparatively minor volume of such commerce now carried in Boston Harbor. Such commerce consists principally of bunkering of vessels, supply of waterfront industries with small amounts of fuel, and distribution to waterfront trucking stations. For the volume of commerce expected in Dorchester Bay, it is considered that the prevailing rates could be reduced. Estimates of such reduction have been made. At current prices, it is estimated that the oil could be carried at $0.60 per ton. The cost estimate reflects actual costs of transportation. Therefore,

in the computation of benefits, the savings to be realized by the use of deep draft vessels, in lieu of barges, will be $0.60 per ton, a direct benefit.

9. Barging costs for coal have also been estimated. At the present time, very little coal is barged in Boston Harbor, as indicated by the 1959 tonnage which totaled 12,000 tons. Such coal movements are made by individual contracts in lots of no more than 500 tons. Prices for these movements averaged from 2 to 3 dollars per ton. These prices are not considered indicative of the barging costs for the volume of traffic expected at Dorchester Bay. Estimates of such costs have been made. At current prices, it is estimated that the coal could be barged for $0.525 per ton. By elimination of the necessity for barging the coal, a benefit of $0.525 per ton would be realized, attributable, to navigational improvement.

10. Computation of Benefits. As mentioned previously in Paragraph 2 of this Appendix, 517,000 tons of oil will be required annually for operation of the first unit. The costs of barging of $0.60 per ton would be 517,000 x $0.60, or $310,200. Elimination of this cost would be a direct benefit to be realized immediately after improvement and continue throughout project life. The total amount of oil when the 4 units are installed minus the 517,000 tons for which savings have been computed, is estimated at 1,093,000 tons annually. It is considered that tonnage will have been reached by the end of 50 years. Savings in transportation costs for this commerce would be 1,093,000 x $0.60 or $655,800. Since this benefit would not be realized until the 50th year of project life, and continue annually thereafter for the remainder of the estimated 100-year project life, its annual average equivalent, or $655,800 x .53286 equalling $349,400 is taken as an annual average benefit attributable to navigation improvement. The sum of the two $310,200 + $349,400, or $659,600 is considered an annual benefit attributable to provision of the channel and basin.

11. For the operation of the first unit, should coal be used, 690,000 tons annually will be required. Costs of barging this coal has been estimated at $0.525 per ton. Elimination of barging will result in savings of 690,000 x $0.525 or $362,200. This would be a direct annual benefit, to be realized immediately after improvement, and continue thereafter during the project life. The coal to be used by the remaining 3 units is estimated to aggregate 1,455,000 tons annually. The savings to be realized from this amount of commerce, by elimination of barge movement will be 1,455,000 x $0.525, or $763,875. Since this savings will not be fully derived until the 50th year of project life, and continue thereafter for the remainder of the estimated 100-year project life

its annual average equivalent is taken as an annual benefit. Thus the annual benefit would be $763,815 x .53286 or $407,000. The sum of the two benefits thus evaluated would be $362,200 + $407,000 or $769,200, attributable to the channel and basin.

12. Benefits for a 40-foot channel have been evaluated. The benefits to be derived would result from reduction or elimination of the tidal delays that would be incurred by deep draft vessels in a 35-foot channel. Tidal delays have been computed for each type of vessel from 26,000 to 46,000 dwt. It was found that the average tidal delay eliminated by provision of the 40-foot channel would result in a saving of $0.014 per ton. The derivation of such savings is shown in Table No. B-1. Costs were based on average distance of 2,100 miles from the shipping port.

TABLE B-1

Channel Depth	Vessel Class (dwt)	Draft	Cargo (Sh. tons)	Cost/Trip Boston	Total Delay Hrs.	Total Delay Cost	Cost/Trip to Dock	Cost per Sh. ton	Difference
35'	26,000	33.5'	27,762	$72,393	1.5	375	$72,768	2.621	
40'	"	"	"	"	0.0	0.0	72,393	2.608	0.013
35'	30,000	33.5'	32,085	82,807	1.5	420	83,227	2.594	
40'	"	"	"	"	0.0	0.0	82,807	2.581	0.013
35'	35,000	35.1	37,600	79,944	1.9	570.0	80,514	2.141	
40'	"	35.1	"	"	0.0	0.0	79,944	2.126	0.015
35'	38,000	36.5	40,872	91,159	3.0	978	92,137	2.254	
40'	"	36.5	40,872	91,159	0.8	261	91,420	2.237	0.011
35'	46,000	38.0	49,700	91,544	3.7	1,236	92,780	1.866	
40'	46,000	38.0	49,700	91,544	1.1	367	91,911	1.849	0.017

Average = 0.014

13. Costs per ton will vary according to the distance, rate of speed and cargo carrying capacity. However, it is believed that the distance used is representative of average distance for receipts of residual oil in Boston Harbor. An average of $0.014 per ton was used for tidal delays in order to obviate the necessity for forecasting individual trips by class of vessel. Estimates of light loading were made in order to compare such costs with tidal delay costs. Light loading extra costs exceeded tidal delay extra costs in each case for all types of vessels.

14. For the 517,000 tons of oil to be used, the savings in the 40-foot channel would be 517,000 x .014, or $7,250. This would be a benefit realized immediately after improvement and annually thereafter. Benefits for the remaining 1,093,000 tons to be realized by the end of the 50th year of project life and continuing annually thereafter for the remainder of the estimated 100-year project life, would be 1,093,000 x $0.014 or $15,300. This amount, reduced to its average annual equivalent amounts to $15,300 x .53286, or $8,150. The sum of the two $7,250 + $8,150, amounting to $15,400, would be the annual benefit for deepening the 35-foot channel to 40 feet.

15. The benefits for coal commerce would be computed in the same manner as oil. Additional tidal delay costs per ton were assumed to be about the same as oil. Savings in coal commerce for the first unit would be 690,000 x $0.014, or $9,660. Savings for the remaining commerce of 1,455,000 tons would be 1,455,000 x $0.014 or $20,370. This amount reduced to its annual average equivalent equals $20,370 x .53286 or $10,840 an annual benefit. The sum of the two $9,660 + $10,840 = $20,500 annual benefits for coal.

16. The cost of deepening the 40-foot channel from 35 to 40 feet has been estimated at $2,300,000. Annual charges for this amount would be about $95,000. These charges, compared with $15,400 benefits for oil result in a Benefit Cost ratio of 0.2, indicating non-justification of further channel deepening from 35 feet to 40 feet.

APPENDIX C

DORCHESTER BAY - NEPONSET RIVER
FISH AND WILDLIFE REPORT

1. The U. S. Fish and Wildlife Service and its related State agency, the Massachusetts Division of Fisheries and Game were consulted during the study. Both agencies agreed that dredging the channel and basin would have no deleterious effect on fish or wildlife. The Service, however, were opposed to some of the spoil disposal areas proposed by local interests. These areas are part of the original tract of land purchased by the Boston Edison Company for plant construction. Generally, the lands are marshes or intertidal flats, lying shoreward of the pierhead and bulkhead lines. In its project planning, the Company contemplated filling these areas, partly by spoil of dredged materials, partly by gradual reclamation by residue from its fuel consumption, and partly by land methods. For its immediate needs, the Company plans to utilize the intertidal flats lying on the north and west sides of its property, retaining the fill by means of a bulkhead on the harbor lines. This fill, on the west side, would be accomplished partly by means of spoil from the required local dredging of approach channel and berth. It is proposed to fill the area on the north side by spoil from the channel and basin. Another area, proposed for fill, is situated on the south side of Thompsons Island.

2. The U. S. Fish and Wildlife Service in its report recommended that no spoil be placed on the marsh areas or on the intertidal flats on the west side of the company's property, placing an average annual value of $210,600 on it. It did not object to spoil placed on the north side of the property or on the south side of Thompsons Island. These areas will be utilized for disposal of materials from the basin and channel. The Massachusetts Fish and Game Commission did not object to filling of the intertidal flats. It did object to filling of the marsh areas, as destruction of a natural wild fowl habitat. The reports of the two services are attached to this Appendix.

3. In summation of the foregoing facts, it is not believed that the ultimate disposition of the areas, to which the U. S. Fish and Wildlife Services objected, is within the bounds of this report. Any disposal of materials by the Boston Edison Company in reclamation of its own marginal lands is felt to be within the limits of its own determination. The company owns the land. Any intrinsic value that may be placed on it in a material way, if lost, would be suffered by the company itself. Apparently the company feels that the average annual value it would realize from plant

construction would outweigh any other value. This is evident from the fact that the company is willing to expend huge sums to reclaim the land. Also, the company intends to fill the land, either hydraulically or by land methods, whether or not it has to transport its fuel by barge, land or deep draft vessels. Since the land is shoreward of established harbor lines, the company does not require Federal permission to exercise its prerogative of filling this area. Therefore, it is felt that the company's final determination with respect to these areas is beyond the scope of this report.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

April 4, 1961

Division Engineer
New England Division
U. S. Army Corps of Engineers
424 Trapelo Road
Waltham 54, Massachusetts

We have received your latest spoil disposal plans for the Dorchester Bay-Neponset River project as outlined on U.S.C. & G.S. Chart No. 246 transmitted to us on February 2, 1961. This letter constitutes our conservation and development report on your navigation project. The Massachusetts Division of Fisheries and Game, and Division of Marine Fisheries concur in these findings.

The plan of improvement now under consideration consists of a 30-foot deep channel through Dorchester Bay to Squantum Point where a 25-foot turning basin will be constructed. It is expected that a portion of the necessary dredging may be done hydraulically and spoil areas which local interests wish considered for disposal of the dredged material are designated as proposed Spoil Area No. 1 on the southern end of Thompson Island and Spoil Area No. 2 along the northern and southern portion of Squantum Point. It is our understanding that these areas are not adequate to contain all the material to be dredged. Material that is not placed in these areas would be dumped at sea.

We conclude that there would be no significant adverse effects by the actual dredging operation on the fish and wildlife resources of the area. There would be no significant adverse effects on fish and wildlife as a result of spoil deposition at sea, in the proposed Spoil Area No. 1 on Thompson Island, or on the northern portion of proposed Spoil Area No. 2 on Squantum Point. However, we would object to spoil disposal on the southern portion of proposed Spoil Area No. 2 located on Squantum Point as depicted in Plate I.

The Southern portion of proposed Spoil Area No. 2 contains soft shell clam resources of significant value. Although the proposal for spoil will encompass 30 acres of land, it is anticipated that as a result of bulkheading, spillage, and siltation at least 40 acres of shellfish habitat would be adversely affected.

Several studies have been made of the soft clam resources of Massachusetts by personnel of the Woods Hole Oceanographic Institute in accordance

with contracts with the Massachusetts Division of Marine Fisheries. Soft clams are considered to be of commercial size when their length is 2 inches. A soft clam in Massachusetts' waters require 2 - 2½ years to attain a length of 2 inches.

One acre of inter-tidal land populated with 25 two-inch clams per square foot will contain 540 bushels of clams. The meat which can be shucked from this quantity weighs 8,100 pounds. The price paid to Massachusetts' fishermen in 1959 was 65¢ per pound of clam meats. An acre populated with soft clams at a density of 25 two-inch individuals per square foot would be valued at $5,265 per acre.

It is known that some particularly favorable localities can support as many as 50 two-inch soft clams per square foot, thereby doubling the production and value figures as given above. As the length of clams is increased, their volume and weight go up in an exponential manner. For example, if the 25 two-inch soft clams per square foot, as described previously, were not harvested for 1/2 to 1 year, they would produce 735 bushels per acre and 11,025 pounds of meats per acre. A managed area in Rhode Island produced 1,500 bushels per acre to the public. Small areas sampled by investigators indicated that the density was about 3,000 bushels per acre. In this instance, the value per acre of soft clam habitat would be 3-6 times greater than our evaluation of $5,265 per acre.

Two areas near the project area, one in Quincy and one in Boston Harbor have been managed to produce a continuous supply of clams. An area in Town River, Quincy, contained 25 to 35 clams per square foot, about half of which were over 2 inches in length. This would be 12 to 18 two-inch clams, or an average of 15 soft clams per square foot. In the Governors Island Flats, near Logan Airport, large areas contained as many as 300 clams per square foot. The majority ranged from 1 to 2 inches in length, but about 3 clams in 10, or 30 clams per square foot, exceeded the 2-inch length.

The values and densities as described above are those derived through natural production with no human control except careful harvesting to avoid depletion of the seed source. As habitat available to these commercial species dwindles and market demands increase, the value of an acre of soft clam habitat becomes more important. Thus, our estimated average annual value of soft clam habitat in the project area at $5,265 per acre is conservative.

We conclude that as much as 40 acres of soft clam habitat would be affected adversely by project related spoil disposal in the southern portion of Spoil Area No. 2 on Squantum Point. The present average annual value of this area with regard to shellfish resources is $210,600. Spoil disposal on this portion of proposed Spoil Area No. 2 would permanently destroy this valuable resource.

Therefore, we recommend that -

(1) No spoil material be placed upon the southern portion of proposed Spoil Area No. 2 located on Squantum Point.

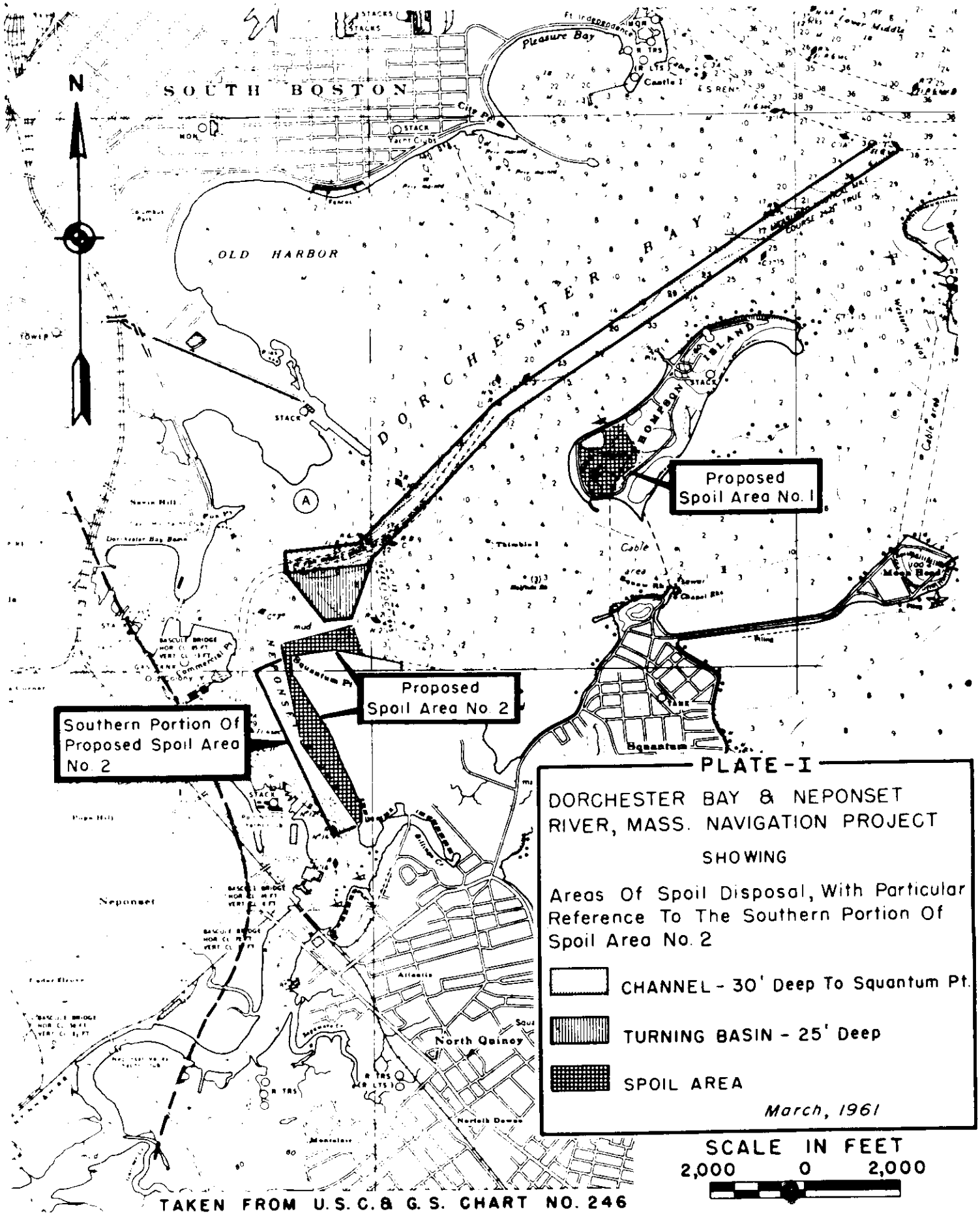
No further studies by our Bureau on this project will be required unless alternate spoil disposal areas are selected. Should alternate spoil disposal areas be selected, we would like to have notification sufficiently in advance of contract letting to prepare a new fish and wildlife report.

The opportunity to report on this project is much appreciated.

Sincerely yours,

John S. Gottschalk
Regional Director
Bureau of Sport Fisheries
and Wildlife

John T. Gharrett
Regional Director
Bureau of Commercial Fisheries



spoil disposal is conducted on the southern part of Thompson Island and the bay area between Thompson Island and Squaw Rock at Squantum. Neither do we forsee any detrimental effects due to spoil disposal at

The Commonwealth of Massachusetts

Division of Fisheries and Game

73 Tremont Street, Boston 8

July 12, 1960

Mr. John Wm. Leslie, Chief
Engineering Division
U. S. Army Corps of Engineers
424 Trapelo Road
Waltham 54, Mass.

Dear Mr. Leslie:

Reference is made to your letter of June 1, 1960 regarding the proposed federal navigation project in Dorchester Bay. We have investigated the effects of spoil disposal on fish and wildlife and our findings follow.

The Dorchester Bay area is one which receives considerable waterfowl usage during migration, particularly in the late fall and early winter. This usage is annually surveyed by air by personnel of this Division and of the U. S. Fish and Wildlife Service.

We envision no detrimental effects to waterfowl if spoil disposal is conducted on the southern part of Thompson Island and the bay area between Thompson Island and Squaw Rock at Squantum. Neither do we forsee any detrimental effects due to spoil disposal at Squantum Point and along most of the area outlined on your map on the Neponset River.

However, based on our aerial waterfowl studies and a recent field check we do find that significant waterfowl values exist in that portion of the eastern side of the Neponset River extending from the bascule bridge north to a point where the small creek joins the main river. We, therefore, recommend that spoil disposal on the

Neponset River proceed south from Squantum Point and terminate opposite navigation marker N "14" on U. S. C. & G. S. Chart No. 246. We further recommend that no disposal or filling be done on the eastern shore, south of this point, nor on the land immediately bordering the creek and its outlet.

Very truly yours,

Charles L. McLaughlin
Director

JSL:ak
c. c. John S. Gottschalk
Milton Anderson

DORCHESTER BAY - NEPONSET RIVER
MASSACHUSETTS

INFORMATION REQUIRED BY SENATE RESOLUTION 148
85TH CONGRESS, ADOPTED 28 JANUARY 1958

1. NAVIGATION PROBLEMS. Dorchester Bay - Neponset River is one of the many waterways forming Boston Harbor, Massachusetts. It is situated in the lower harbor, immediately adjacent to the 40-foot main ship channel. It has been Federally-improved for a distance of about 4 miles. Channels in this section have a depth of 18 feet for about 3 miles to the river entrance and 15 feet for about one mile in the river. The Commonwealth of Massachusetts has improved the river for about 2 miles above the Federal Channel. A 6-foot deep channel has been dredged in this section. The current commerce in the waterway consists entirely of petroleum products, gas oil, and distillate fuel oil of which about 35,000 tons are received annually.

2. The present vessel traffic encounters no navigational difficulty. The largest vessel currently using the waterway is a self-propelled motor barge drawing about 13 feet. Future vessel traffic is expected to consist of deep draft vessels drawing 32 or more feet. These vessels will carry fuel to a power plant which will be installed on the waterway. Commerce to this plant is expected to total 517,000 to 690,000 tons in the first year's operation of the plant. It will increase substantially during project life and is expected to reach an ultimate volume of 1,610,000 to 2,145,000 tons by the 50th year of the project life of 100 years. To carry this volume of traffic economically, deep draft vessels will be necessary. The present 15- and 18-foot channels are inadequate for such vessels.

3. IMPROVEMENTS CONSIDERED. Aside from general deepening of the waterway to allow for anticipated deep draft vessel traffic only one plan of improvement was tendered by local interests. The general deepening, it was claimed, would promote expansion of industries requiring such traffic. The specific plan was presented by the electrical power interests planning to install a power plant at Squantum Point near the entrance to the river. The plan consisted of a channel 35 feet deep and 250 to 300 feet wide, preferably 300 feet, extending from the main 40-foot ship channel to the vicinity of Squantum Point. A turning basin and maneuvering basin of a suitable depth and width to enable vessels to be turned, or to maneuver into approach channels was also requested. Various widths and depths of channels were studied. A channel depth of 35 feet was found to be economically justified, but to a depth of 40 feet was found not to be justified. Deepening and widening the entire length of the existing Federal project was also considered. No evidence of the

need for such a deep channel above Squantum Point could be found. Therefore, no further consideration was given to this phase of improvement.

4. RECOMMENDED IMPROVEMENT. To provide adequate depth and width for future deep draft vessel traffic, expected to carry fuel commerce to the proposed power plant, a channel 35 feet and 300 feet wide is recommended. A turning basin 35 feet deep and about 33 acres in area is also recommended. Estimated first costs, annual costs, and annual benefits are based on May 1961 price levels, a 100-year project life, and interest rates of 2.625 percent on Federal funds and 4 percent on non-Federal funds.

5. APPORTIONMENT OF COSTS AND LOCAL COOPERATION. The prospective navigation benefits, to be realized from improvement of the waterway, are considered general in nature. The benefits will be derived from savings in transportation costs for fuel to be delivered to a public utility, engaged in the generation of electric power. Since the utility's power rates are controlled by State regulation, based on costs of generation, it is considered that savings in transportation costs are reflected in lower power rates thus constituting a general benefit to the tributary area. In addition, there is ample room for industrial expansion in the waterway which, local interests contend, will materialize with provision of a deep draft channel. In view of these aspects of improvement, it is considered that the Federal Government should provide the channel and basin. However, local interests should be required, as a measure of local cooperation to:

a. Construct the first 250,000 kw unit of the power plant, the construction to be accomplished prior to or at the time of construction of navigational improvement.

b. Dredge an approach channel and berth commensurate with channel depth. The estimated cost of this dredging is $315,000 (1961).

c. Provide, without cost to the United States, all lands, easements and rights-of-way necessary for construction of the project.

d. Hold and save the United States free from damages that may result from the construction works, and

e. If it be determined in detailed studies that spoil disposal areas are needed, local interests will agree to furnish, upon the request of the Chief of Engineers and without cost to the United States, any such areas required, including such dikes, bulkheads and embankments as may be necessary, for the initial dredging and subsequent maintenance.

6. The estimated costs are as follows:

a. Estimated First Cost of Construction

Federal	$7,085,000
Non-Federal	315,000
Total Estimated First Cost of Construction	$7,400,000

b. Estimated Annual Charges

	Federal	Non-Federal	Total
Interest and Amortization	$201,000	$12,800	$213,800
Maintenance	11,000	-	11,000
Total Estimated Annual Charges	$212,000	$12,800	$224,800

c. Estimated Annual Benefits $659,600

d. Benefit/Cost Ratio = 2.9

7. DISCUSSION. Local interests have been advised of the recommended improvement. The Commonwealth of Massachusetts has provided reasonable assurance on the requirements of local cooperation. The recommended plan of improvement provides the most feasible and economical method of meeting the anticipated needs of navigation on the waterway. The project is considered justifiable on the basis of studies in the report and criteria on similar navigation projects. The requirements of local cooperation are in consonance with similar navigation projects.

CORPS OF ENGINEERS

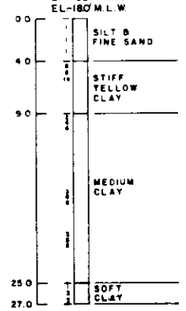
U. S. ARMY

LIST OF PROBINGS

NUMBER	DEPTH OF WATER	ELEVATION BELOW M.L.W. TO OPTION REFUSAL	TO OPTION PENE	PENETRATION NO. OF BLOWS LAST 6" PEN	MATERIAL
1	27.0	37.0	100	49	
2	21.0	37.0	160	77	
3	23.0	37.0	140	91	
4	17.0	37.0	200	68	
5	21.8	37.0	15.2	33	
6	18.3	37.0	18.7	23	
7	18.0	37.0	190	38	
8	15.3	340	185	212	Refusal
8A	17.0	37.0	200	121	
9	17.5	37.0	195	40	
10	18.0	37.0	210	25	
11	17.0	37.0	200	18	
12	27.0	37.0	100	1	
13	30.0	37.0	70	1	
14	31.0	37.0	60	2	
15	30.0	37.0	70	3	
16	36.0	37.0	10	1	
17	33.0	37.0	40	2	
17A	21.5	37.0	155	4	
18	27.0	37.0	100	4	
19	27.0	37.0	100	11	
20	27.0	37.0	100	72	

E 738,000

FD-A
27 FEB 1959
EL -18.0' M.L.W.



NOTE

Figures to left of column are number of blows of 140 lb weight falling 30 inches required to drive sampling pipe 6 inches.

DESIRED IMPROVEMENT RECOMMENDED

CHANNEL 35 FEET DEEP

LEGEND

EXISTING PROJECT
DESIRED IMPROVEMENT
PROBINGS P-00
BORINGS FD-A
MEAN HIGH WATER

NOTES

Hydrography from survey by New England Survey Service (1959).

Probings and Borings by Raymond Concrete Pile Co. (1959).

Probings taken with 1" pipe using 140 lb. weight falling 30 inches.

Topography by New England Survey Service (1959).

Soundings are in feet and tenths and refer to the plane of Mean Low Water.

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.

DORCHESTER BAY & NEPONSET RIVER MASSACHUSETTS

SHEET 1 OF 6 SCALE IN FEET 200 0 200 400 600 MAY 1961

APPROVED:
FOR THE NEPONSET RIVER
CHIEF, PLANNING BRANCH
CHIEF, RIVER DIVISION
CHIEF, ENGINEERING DIVISION
PROJECT ENGINEER

TO ACCOMPANY SURVEY REPORT DATED OCT. 13, 1961

FILE NO. 126—Dr. 40

REV. 10-61

CORPS OF ENGINEERS

U. S. ARMY

LIST OF PROBINGS

NUMBER	DEPTH OF WATER	ELEVATION BELOW M.L.W. DEPTH OF PROBE	PENETRATION NO. BLOWS LAST FT. PEN.	MATER A.
21	260	370	110	6
22	310	360	50	4
23	150	370	220	97
24	180	370	190	18
25	200	370	170	5
26	220	370	150	5
27	210	370	160	5
28	190	370	180	6
29	200	370	170	17
30	160	370	210	37
31	125	370	245	98
32	120	370	250	4
33	140	370	230	42
34	170	370	200	7

N 481,000

E 726,000

E 728,000

E 730,000

N

DORCHESTER BAY

P-21

P-23

P-24

P-25

P-26

P-27

P-28

P-29

P-30

P-31

P-32

P-33

P-34

SHEET MATCH LINE NO 1

N 481,000

THOMPSON ACADEMY

THOMPSON ISLAND

DESIRED IMPROVEMENT RECOMMENDED

CHANNEL 35-FEET DEEP

EXISTING 18-FOOT CHANNEL

175'

300'

DIKE

N 479,000 COW PASTURE

Flood

Ebb

SEWER TUNNEL TOP EL -140

MATCH LINE SHEET NO 3

N 479,000

POSSIBLE SPOIL AREA

E 732,000

N 477,000

E 726,000

E 728,000

E 730,000

N 477,000

LEGEND

EXISTING PROJECT

DESIRED IMPROVEMENT

PROBINGS ● P-00

MEAN HIGH WATER

NOTE

For general notes see sheet No 1

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS

DORCHESTER BAY & NEPONSET RIVER MASSACHUSETTS

SHEET 2 OF 6 SCALE IN FEET 200 0 200 400 600 MAY 1961

APPROVED

CHIEF, ENGINEERING DIVISION

CHIEF, ENGINEERING REPORTS BRANCH

CHIEF, PLANNING BRANCH

PROJECT ENGINEER

TO ACCOMPANY SURVEY REPORT DATED OCT 13, 1961

FILE NO. 126 — Dr. 40

REV 10-61

CORPS OF ENGINEERS

U. S. ARMY

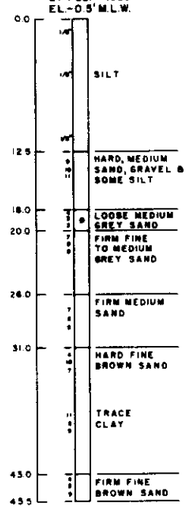
DORCHESTER BAY & NEPONSET RIVER MASSACHUSETTS

SHEET 3 OF 6 — SCALE IN FEET — MAY 1961

LIST OF PROBINGS

NUMBER	DEPTH OF WATER (ELEVATION BELOW M.L.W.)	DEPTH OF PROBE (ELEVATION BELOW M.L.W.)	PENETRATION	NO. OF BLOWS LAST FT. PEN.	MATERIAL
35	16.0	37.0	21.0	5	
36	5.0	37.0	32.0	13	
37	1.5	35.5	34.0	49	
38	1.0	37.0	36.0	31	
39	8.5	37.0	28.5	8	
40	12.0	37.0	25.0	6	
41	0.0	37.0	37.0	41	
42	17.0	37.0	20.0	8	
43	7.0	37.0	30.0	29	
44	17.0	37.0	20.0	29	
45	13.0	37.0	24.0	30	
46	10.0	37.0	27.0	20	
47	+3.0	37.0	40.0	9	
48	26.0	37.0	11.0	10	
49	11.0	37.0	26.0	19	
50	+3.0	37.0	40.0	24	
51	+2.0	37.0	39.0	29	
52	8.5	35.5	27.0	24	
53	+0.0	37.0	37.0	43	
54	+2.5	37.0	39.5	30	
55	+2.0	37.0	39.0	36	

FD-B
27 FEB. 1959
EL. -0.5' M.L.W.



NOTE

Figures to left of column are number of blows of 140 lb weight falling 30 inches required to drive sampling pipe 6 inches

DESIRED IMPROVEMENT RECOMMENDED

CHANNEL 35-FEET DEEP

TURNING BASIN 35-FEET DEEP

CONSIDERED IMPROVEMENT NOT RECOMMENDED

CHANNEL 35-FEET DEEP

DORCHESTER BAY

DORCHESTER BAY BASIN

BOSTON

COMMERCIAL POINT

SQUANTUM POINT

QUINCY

NEPONSET RIVER

BERTH (LOCAL INTERESTS)

EXISTING 18-FOOT CHANNEL

EXISTING 15-FOOT CHANNEL

BASCULE BRIDGE
HOR CL 65'0"
VERT CL 13'0"

MORRISSEY BOULEVARD

SOUTHEAST EXPRESSWAY

FREEPORT STREET

VICTORY ROAD

PIERHEAD LINE

BULKHEAD LINE

PIERHEAD & BULKHEAD LINE

PIERHEAD & BULKHEAD LINE

BOSTON GAS COMPANY

GULF OIL CO.

BOSTON EDISON COMPANY

EXISTING STEEL BULKHEAD

EXISTING WOODEN BULKHEAD

SUBMARINE CABLE 17.0' M.L.W.

Flood

Ebb

100'

300'

P-34 P-35 P-36 P-37 P-38 P-39 P-40 P-41 P-42 P-43 P-44 P-45 P-46 P-47 P-48 P-49 P-50 P-51 P-52 P-53 P-54 P-55 FD-B

N 477,000

N 475,000

N 473,000

E 722,000

E 724,000

E 726,000

SHEET NO. 2 MATCH LINE

MATCH LINE SHEET NO. 4

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.

SUBMITTED

CHIEF, ENGINEERING DIVISION

CHIEF, PLANNING BRANCH

CHIEF, ENGINEERING BRANCH

PROJECT ENGINEER

DR. BY

TR. BY

CH. BY

TO ACCOMPANY SURVEY REPORT DATED OCT 13, 1961

FILE NO. 126 - Dr. 40

REV. 10-61

CORPS OF ENGINEERS

U. S. ARMY

E 122,000

E 124,000

E 126,000

E 128,000

N 471,000

N 469,000

BOSTON EDISON COMPANY

SHEET NO 3 MATCH LINE

N

BULKHEAD LINE

P-57

P-56

P-59

P-58

P-60

P-61

P-62

P-63

P-64

P-65

P-66

300

100

DESIRED IMPROVEMENT
NOT RECOMMENDED
CHANNEL 300 FEET WIDE 35 FEET DEEP

BOSTON BASIN & MARINE WORKS

YACHT

TRACY YACHT BASIN

PIERHEAD LINE

NEW HAVEN

SOUTHEAST EXPRESSWAY

RAILROAD

RIGHT OF WAY

1 SUBMARINE CABLE
18' BELOW M.L.W.
WESTERN UNION

BILLINGS CREEK

BOSTON

QUINCY

STEARNS LUMBER

BLAKESLEE ROLLSTONE CO. INC.

NORTHEAST MARINE SERVICE

4 SUBMARINE CABLES
23 4' BELOW M.L.W.
NEW HAVEN R.R.

7 SUBMARINE CABLES
22' BELOW M.L.W.
EDISON CO. & N.E.T.&T. CO.

NEPONSET HIGHWAY BRIDGE

MURPHY'S REGISTMA CO.

SUBMARINE CABLE
18' BELOW M.L.W.

3 SUBMARINE CABLES
18' BELOW M.L.W.
NEW HAVEN R.R.

PIERHEAD & BULKHEAD LINE

UPSTREAM LIMIT
CONSIDERED IMPROVEMENT

UPSTREAM LIMIT EXISTING
15-FOOT PROJECT

MATCH LINE SHEET NO 3

LEGEND

EXISTING PROJECT

DESIRED IMPROVEMENT

PIERHEAD & BULKHEAD LINE

LIST OF PROBINGS

NUMBER	DEPTH OF WATER	ELEVATION BELOW M.L.W. DEPTH OF PROBE	PENETRATION NO BLOWS CAST FT PEN.	MATERIAL
56	0.0	370	370	34
57	+1.0	370	380	36
58	0.0	370	370	28
59	+2.0	370	390	72
60	0.0	370	370	47
61	1.60	370	210	31
62	0.0	370	370	81
63	2.0	370	350	37
64	3.5	370	335	7
66	5.0	370	320	16

NOTE

For general notes see sheet No. 1.

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.

DORCHESTER BAY & NEPONSET RIVER MASSACHUSETTS

SHEET 4 OF 6 SCALE IN FEET 200 0 200 400 600 MAY 1961

APPROVED

CHF. ENGINEERING DIVISION

SUBMITTED

CHF. PLANNING AND VISITORS BRANCH

CHF. RIVER AND HARBOR SECT.

PROJECT ENGINEER

DR BY T.O.

CH BY

TO ACCOMPANY SURVEY REPORT DATED OCT 13, 1961

FILE NO. 126 - Dr. 40

REV. 10-61

CORPS OF ENGINEERS

U. S. ARMY

E 122,000

E 124,000

E 126,000

N 469,000

N 467,000

N 465,000

N

BOSTON

NEPONSET HIGHWAY BRIDGE

SHEET NO 4 MATCH LINE

DRIVE (1959)

EGG 2 (1959)

THEATRE (1959)

GARDINER (1959)

BRIDGE EXPRESSWAY

SOUTHEAST ROY C SMITH LINE

SHEET NO 6 MATCH LINE

BRIDGE (1959)

Flood

Ebb

TOWER (1959)

DESIRED IMPROVEMENT
NOT RECOMMENDED
CHANNEL 15 FEET DEEP

STATE 6-FOOT CHANNEL
(LIMITS INDEFINITE)

NOTE

Survey of October 5,6,13&14,1959, by J. Rock (U.S. Army Corps Of Eng'rs)

Mean Low Water Line . . . . . .

MILTON

QUINCY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.

DORCHESTER BAY & NEPONSET RIVER MASSACHUSETTS

SHEET 5 OF 6 SCALE IN FEET 200 0 200 400 800 MAY 1961

APPROVED

SUBMITTED

TO ACCOMPANY SURVEY REPORT DATED OCT. 13, 1961.

FILE NO. 126—Dr. 40

CORPS OF ENGINEERS

U. S. ARMY

DESIRED IMPROVEMENT
NOT RECOMMENDED
CHANNEL 15 FEET DEEP

STATE 6-FOOT CHANNEL
(LIMITS INDEFINITE)

BOSTON

SOUTHEAST

ROY C. SMITH BRIDGE

EXPRESSWAY

BRIDGE (1959)

MATCH LINE SHEET NO. 5

BARNEY & CAREY

NEPONSET VALLEY YACHT CLUB

SAGN (1959)

HEAD OF NAVIGATION

METROPOLITAN DISTRICT COMMISSION

MILTON LOWER MILLS

GODFREY COAL CO.

YACHT (1959)

Flood

Ebb

MILTON

NOTE

Survey of October 5,6,13&14,1959, by J. Rock. (U.S. Army Corps Of Eng'rs.)

Mean Low Water Line . . . . . .

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.

DORCHESTER BAY & NEPONSET RIVER MASSACHUSETTS

SHEET 6 OF 6 SCALE IN FEET 400 0 200 400 800 MAY 1961

APPROVED

CHIEF ENGINEER-GS DIVISION

SUBMITTED

CHIEF, PLANNING & REPORTS BRANCH

CHIEF, RIVER AND HARBOR SECTION

PROJECT ENGINEER

TO ACCOMPANY SURVEY REPORT DATED OCT. 13, 1961.

FILE NO 126—Dr. 40